

# PATHOLOGIST'S HANDBOOK

*KELYNACK*

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# THE PATHOLOGIST'S HANDBOOK



# THE PATHOLOGIST'S HANDBOOK:

A MANUAL FOR THE POST-MORTEM ROOM

BY

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COLLEGE

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## PREFACE

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THIS little Handbook had its origin in a series of papers written for the 'Manchester Royal Infirmary Students' Gazette.' Although considerably extended, the original form of the articles has, as far as possible, been retained. While fully recognising that post-mortem technique can only be satisfactorily learnt in the post-mortem room, I have attempted, after many years' experience of teaching in the Pathological Department of the Manchester Royal Infirmary, to furnish a concise guide for Students acting as Clerks in the post-mortem room, and a suggestive manual for Junior Practitioners.

My main object has been to indicate methods. Reference to special lesions has to a very great extent been omitted. For descriptions of these the Student will naturally refer to his textbooks on Morbid Anatomy.

My best thanks are due to Dr Fothergill for several of the drawings from which figures have been prepared ; and to Mr W. S. Kelynack for many of the photographs.

A few illustrations have been reproduced from works already published by Messrs J. & A. Churchill, but where this is the case the source is clearly indicated, and I would here acknowledge my indebtedness, both to authors and publishers, for the use of the same.

I have also to thank Messrs Weiss & Son for their courtesy in providing the blocks for the illustrations of the instruments.

T. N. KELYNACK.

3, ST. PETER'S SQUARE,  
MANCHESTER ;  
*September, 1899.*

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## CHAPTER I

### INTRODUCTION

A THOROUGH knowledge of morbid anatomy forms the surest basis for the practice of scientific medicine. Without it the practitioner becomes little better than a mere empiric. Time and opportunity, unfortunately, limit the study of practical pathology for most to the brief period of student life. As Dr Goodhart has well expressed it, "the field of clinical observation is always with us; but student life over, the opportunity of making any extensive additions to our knowledge of disease as it shows itself after death, is gone, and poor, indeed, to my thinking, is he who is not well-furnished in this respect."

Valuable as are descriptions, illustrations, and museum preparations, they cannot set aside the necessity for personal observation of diseased structures as met with in post-mortem examinations. A recognition of the importance of morbid anatomy should prompt to an energetic and persistent study of the same. The correct-

ness and completeness of every ante-mortem diagnosis ought to be tested by a post-mortem inspection. Compliance with a doctrine of perfection is usually impossible, but every physician should feel it a duty which he owes to himself, as well as to the profession at large, to seek permission to make a post-mortem examination where possible.

Regular attendance in the post-mortem room is essential for a practical knowledge of disease. Morbid anatomy deals with facts. Theories as to the nature and causation of disease may come and go; experimental pathology may establish or dispel particular views; but a study of morbid anatomy is a necessity to each generation of students, and should be as much a subject of personal inquiry to the senior student as normal anatomy is supposed to be to the junior.

Seeing, with most, is not only believing, but remembering, and, to a considerable extent, understanding. The atmosphere of the post-mortem room whets the appetite for investigation into the problems of disease. The revelations of the pathological department not only indicate what disease can accomplish, but explain clinical features, suggest lines for rational treatment, and oftentimes encourage a healthy and reasonable optimism by demonstrating the wonderful compensatory powers of nature.

Pathological specimens are frequently examined by students too much as though they

were mere curios, concerning which an inquisitive examiner might some day desire enlightenment. An intelligent inspection of pathological material should be something very different from this; as Latham puts it, "so far as morbid anatomy contemplates the last or latest results of disease that are fixed and irremediable and unalterable its value is very small; but so far as morbid anatomy contemplates *disease in progress*, and scrutinises and explains its organic processes, its value is very great."

Every student should not only make it a rule to attend regularly in the post-mortem room, but also to actively participate in the conduct of examinations.

It is necessary to be acquainted with the evidences of healthy and morbid processes in all their varying manifestations. And it is also desirable to be able to select the most suitable methods of investigation and demonstration.

Until a student becomes qualified he can scarcely realise the importance of a practical acquaintance with pathology. As the law now stands, any practitioner may find himself suddenly called upon to undertake most important pathological investigations, and be compelled to give opinions which will not only seriously affect his own credit, but may influence the highest interests of others, and lead to the most serious consequences. Neglect of morbid anatomy during student days must prove an almost

irreparable loss, and may lead to much ignorant blundering in medico-legal cases, thereby bringing disgrace on self, defeating justice, and delaying progress, both moral and scientific.

In the pursuit of practical morbid anatomy there is the greatest necessity for system in inspecting, dissecting, and recording. While adopting some method of general application one must be ready to modify or adapt according to the requirements of special cases, and to meet the needs of special forms of inquiry.

In the following chapters I shall endeavour to indicate the most convenient methods of conducting post-mortem examinations, and with directions, suggestions, and warnings, shall hope to present something which may be of service in the scientific investigation of disease in hospital and private cases, and in the unravelling of pathological cases in their medico-legal aspects.\*

\* The following list of works dealing with post-mortem technique may be of service for purposes of reference :

BLACKBURN, I. W. A Manual of Autopsies, designed for the use of Hospitals for the Insane and other Public Institutions. 1892.

CAIRD and CATHCART. A Surgical Handbook. 1896. 7th edition, p. 242.

CHIARI. Pathologisch-anatomische Sectionstechnik. 1894.

CLARKE, J. JACKSON. Post-mortem Examinations in Medico-legal and Ordinary Cases. 1896.

DELAFIELD and PRUDDEN. Pathological Anatomy. 1896.

GANNETT. Post-mortem Examinations: Reference Hand-

- book of the Medical Sciences. Vol. v, 1889, pp. 783—791.
- GOUBERT. *Manuel de l'Art des Autopsies, surtout dans ses applications à l'Anatomie pathologique.* 1867. (References given to many of the early works on the subject.)
- HAMILTON. *Text-book of Pathology.* Vol. i, 1889, pp. 1—42.
- HARRIS, THOMAS. *Post-mortem Handbook.* 1887.
- HEKTOEN. *Post-mortem Technique.* 1894.
- HUDSON. Article in 'Dictionary of Practical Medicine,' edited by J. K. Fowler, M.D. 1890, pp. 665—669.
- MALLORY and WRIGHT. *Pathological Technique.* 1898, pp. 17—69.
- NAUWERCK. *Sectionstechnik.* 1891.
- NEWTN. *A Manual of Necroscopy.* 1878.
- ORTH. *Pathologisch-anatomische Diagnostik.* 1894.
- ROLLESTON and KANTHACK. *Manual of Practical Morbid Anatomy, being a Handbook for the Post-mortem Room.* 1894.
- THOMAS, A. R. *A Practical Guide for making Post-mortem Examinations and for the Study of Morbid Anatomy.* 1873.
- VIRCHOW. *Post-mortem Examinations.* (English translation by Dr. T. P. Smith.) 1880.
- WARTHIN. *Practical Pathology for Students and Physicians.* 1897.
- WOODHEAD, G. SIMS. *Practical Pathology.* 1892, pp. 1—29.
- WYNTER and WETHERED. *A Manual of Clinical and Practical Pathology.* 1890, p. 285.

## CHAPTER II

### GENERAL CONSIDERATIONS

BEFORE proceeding to indicate the method of conducting a post-mortem examination, it may be well briefly to refer to certain general points of practical importance.

**Prevention of Post-mortem Wounds.**—In the first place the pathologist, and students acting with him, should always be in thoroughly good health. The dangers from infection are undoubtedly much increased to a man “run down.” Special care must be bestowed upon the hands and arms, and, generally speaking, no examination is to be undertaken if these be in any way damaged. It is a good rule to consider all matter met with in the post-mortem room as infective. It is important to explain the risk and indicate the appropriate treatment of cuts and pricks to the students and attendants, lest by negligence or ignorance they become seriously infected.

Jackson Clarke\* believes that by a simple

\* Clarke (J. Jackson), ‘Post-mortem Examinations in Medico-legal and Ordinary Cases,’ 1896.

system of antiseptic precautions every danger may be removed from post-mortem work, and goes so far as to express an opinion that "there is not so much danger in performing any surgical operation immediately after making a post-mortem examination as there is in going from one surgical operation in which pus is encountered to another." Still, in spite of this view, the old impression has much in its favour, that post-mortem investigations should not be carried on by anyone actually engaged in surgical, gynæcological, or midwifery work.

Should any injury be received during the course of a post-mortem, the affected part must at once be soaked in strong perchloride of mercury solution, which should always be at hand in suitable strengths for immediate use. If it is absolutely necessary to continue the examination after a cut or scratch has been received, the affected part may sometimes be safely covered by painting it over with celloidin dissolved in alcohol and ether. Rubber cots are very useful for lame fingers, and a very satisfactory protection may be afforded by covering the affected digit with surgical tissue, the edges of which can be rendered adherent by chloroform. Many protect the hands by wearing india-rubber gloves. Some strongly advise the use of photographer's gloves, made of "stockinette," covered with india rubber. Personally I generally prefer to work without this rather

cumbersome and often doubtful protection. In such cases, however, as acute septic peritonitis, where infection of the hair-follicles may readily occur, good rubber gloves are undoubtedly useful. They should be made long in the wrist.

It is a good plan in all cases to rub vaseline or a suitable ointment into the hands and arms before commencing work. It should be non-odorous, insoluble in the fluids of the body, and leave no stain on the hands. Some advise a stiff ointment, such as may be made by combining beeswax and vaseline, or vaseline and some of the solid paraffins. Sometimes it may be well to insert soap under the ends of the nails.

All infective matter should be dealt with promptly. The instruments, tables, and whole post-mortem room must be kept scrupulously clean. A plentiful supply of disinfectants and deodorants should always be kept ready for immediate use.

**Cleansing of the Hands.**—After an autopsy the hands should be thoroughly cleansed with soap and hot water, soaked, if necessary, in some deodorant,\* then placed in a solution of biniodide of mercury and potassium, or per-

\* After trying a number of different deodorants, I find "Jeyes' fluid" the most agreeable. "Izal" or other modern disinfectant may be used with advantage. "Condy's fluid" has the disadvantage of staining when used in strong solution. Turpentine and "Sanitas" are also useful as deodorants. Some of the recently introduced antiseptic soaps are very convenient. Parke, Davis, and Co. supply a very useful "ethereal antiseptic

chloride of mercury, and finally washed again with ordinary soap and water.

**Protection of the Operator.**—The operator should be protected by a large apron and sleeves. The most convenient is made of stout washing material. Strong jaconet is occasionally employed.

The protecting gown or apron should be made so as practically to envelop the whole body. It should come up high in the neck, reach to just below the bottom of the trousers, and also thoroughly protect the back of the operator. Buttons should not be used, as they are soon broken in washing. The sleeves should be made separately. An elastic band at their ends will readily keep them in position over the rolled-up shirt sleeves. Any capable seamstress should be able to construct a serviceable garb.

The post-mortem room should be supplied with a small mirror, so that the operator may satisfy himself that no evidences of the character of his work are left upon him before appearing in public.

**Time and Place of Examination.**—A post-mortem examination should never be made at night. Artificial light, if possible, is always to be avoided, particularly in coroners' cases.

Justice and medical science would much benefit if the investigation of medico-legal soap," which will be found of service for rapidly and thoroughly cleaning the hands.

cases could always be carried out in a well-lighted and suitably equipped post-mortem room, which, where possible, should be in connection with a medical school, or at all events in some central situation, and freely open to all students and practitioners.

**Permission for Autopsy.**—In most English hospitals permission for a post-mortem examination has to be obtained from the nearest relative of the deceased. Some institutions require permission to be given in writing. It would be well if all hospitals could so frame their bye-laws as to allow of an examination being made as a matter of course. At the present time, doubtless, public opinion in many districts would be strongly against such an arrangement.

In coroners' cases the body must not be touched without a formal order from the coroner himself.

To prevent the possibility of any confusion, every body should have an enamelled plate bearing a number, corresponding to the mortuary register, fixed on the wrist before the body is removed to the post-mortem room.

If what may be termed the æsthetic or sentimental side of the question were more generally attended to, it is very probable the public would soon show less repugnance to the holding of pathological examinations. The care of a mortuary is a matter of real importance. Every

hospital should have a mortuary chapel, with suitable arrangements for the viewing of the corpse by the friends.

**Clinical Abstract.**—In every hospital case the pathologist should be furnished with an abstract giving the following data:—Name, age, occupation, residence, date of admission, death, operation (if any has been performed), name of physician or surgeon, and clinical diagnosis. Then should follow a brief outline of the history of the case, and with advantage there may be added a list of the lesions expected to be found.

**Medico-legal Cases.**—In all medico-legal investigations the pathologist should enter upon the inquiry with a perfectly unbiassed mind. In all these cases accuracy and thoroughness are the great essentials. In many coroners' cases it is well not to start the examination until a police officer is present. In a medico-legal autopsy every medical man connected with the case should be granted the opportunity of being present. The giving of due notice as to time and place should be considered part of the duties of the police officer having charge of the case.

Before commencing an examination the pathologist should carefully select the necessary instruments, and have everything needed for the full investigation of the case ready at hand. Rapidity of execution is often an important factor.

It is well to dictate the notes of the case as the examination is proceeding. These should indicate pathological facts, give full descriptions of lesions observed, but no opinions or inferences should be expressed in a medico-legal report. In cases likely to lead to litigation I have generally found it wise to ask all the medical men present to sign the report in evidence of their agreement with the facts therein stated. Their opinion as to the cause, nature, and general bearing of the case is thereby not interfered with, and much of the quibbling as to facts which tend to make medical men ridiculous in the eyes of the public may be avoided.

On completing an examination the body should be so left as to show practically no evidence that it has been touched. This matter will be referred to later when dealing with the restitution of the body.

**Systematic Examination.**—A complete investigation must be systematic, and may oftentimes be a very lengthy affair. In many cases it does not close with the mere examination of the body. A complete post-mortem may necessitate reports on—(1) External appearances; (2) Internal morbid anatomy; (3) Morbid histology; (4) Pathological chemistry; (5) Bacteriology.

## CHAPTER III

### INSTRUMENTS

FOR the satisfactory conduct of a complete post-mortem examination only a comparatively small number of instruments are absolutely necessary. There are, however, a number of appliances which are very desirable, and usually provided in a well-equipped pathological department. Still, it is wise to remember that should one be suddenly called upon to undertake a post-mortem investigation in an out-of-the-way district, where suitable instruments are not available, the scientific investigation of an important case must not be allowed to pass, for difficult though it may be, a reliable and complete autopsy may be made by means of a strong, sharp clasp-knife, a carpenter's or butcher's saw, domestic scissors, and an ordinary chisel and mallet.

I propose very briefly to indicate the chief instruments in general use. Any lengthy description is rendered quite unnecessary by the accompanying illustrations.

The actual methods of best employing these different instruments can, of course, only be learnt by actual work in the post-mortem room.

*Knives.*—Several forms are in common use.

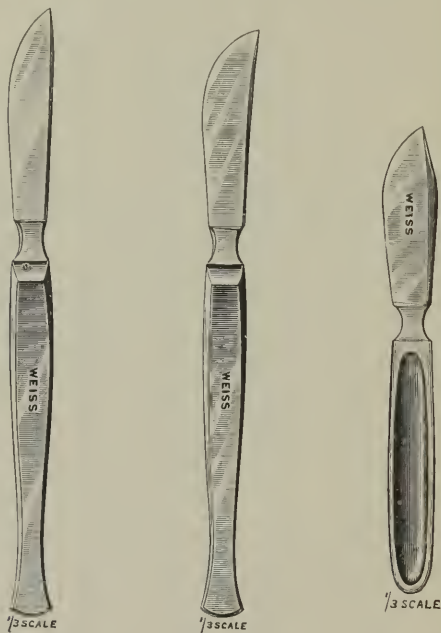


FIG. 1.—Ordinary post-mortem knife.

FIG. 2.—Strong post-mortem knife.

FIG. 3.—Cartilage knife.

The type usually spoken of as *Virchow's post-mortem knife* (Fig. 1) is by far the best for the major part of every examination.

A stronger form, but of the same type, is used for cutting through the costal cartilages (Fig. 2).

The most modern form is where the knife and handle are made from one piece of metal, thus adding to the strength and rendering perfect cleansing easy (Fig. 3).

In many cases fitted in this country the old-fashioned *English cartilage knife* will be found, which, though good and effectual, is not so convenient as the Continental forms.

It will thus be seen that the most generally useful knife is constructed on the principle of a butcher's knife. The blade is large, with a deep belly and with a rounded end. It must be firmly fixed in the handle, which should be large enough to be comfortably grasped by the hand.

It is well to have several of these knives, so that duplicates may always be available when it is necessary for some to be sent to be re-sharpened.

*Long-bladed knives* of the amputation type, are necessary for the dissection of the brain, the separation of the intestines from their mesentery, and the section of large organs (Fig. 4).

A large flat *section or brain knife* is often convenient (Fig. 5).

*Scalpels* of different sizes and varying forms are useful for dissection (Figs. 6, 7, 8, 9).

Short-bladed strong knives have been specially

introduced for disarticulating at the sterno-clavicular joints.

A *myclotome* is a knife with the blade set



FIG. 4.—Long section knife.



FIG. 5.—Brain knife.

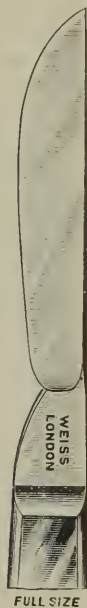


FIG. 6.—Scalpel.

almost at a right angle to the handle, and is used for cleanly and transversely cutting across the spinal cord low down when removing the brain.

A curved probe-pointed bistoury is espe-

cially useful for dividing the dura mater in removing the brain (Fig. 10).

A trowel-shanked section knife is occasionally found convenient (Fig. 11).

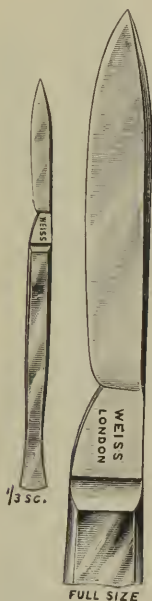


FIG. 7.—Scalpel.

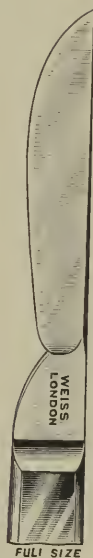


FIG. 8.—Scalpel.

The double-bladed section knife is not now frequently used (Fig. 12).

A hollow-ground razor is very useful for cutting thin slices of fresh tissues.

*Scissors.*—An ordinary, strong, straight pair is the most generally useful (Fig. 13). Some-

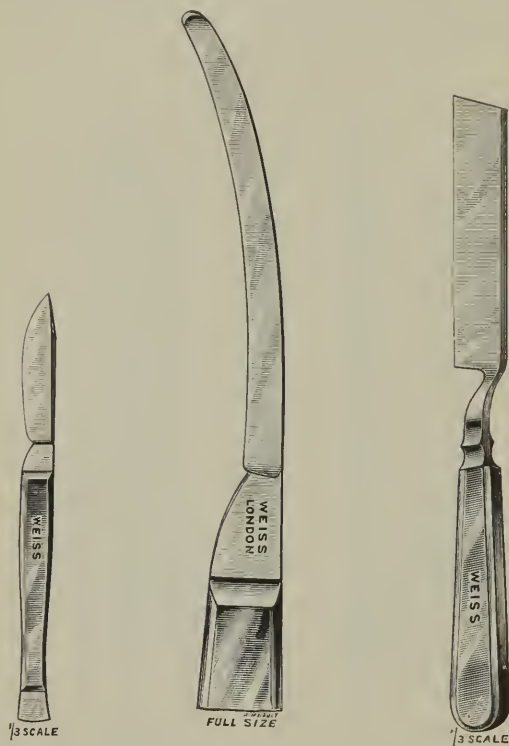


FIG. 9.— FIG. 10.—Probe-pointed FIG. 11.—Trowel-shanked  
Scalpel. curved bistoury. section knife.

times scissors having a curved or angular form are exceedingly convenient (Figs. 14 and 15).

The bowel scissors or *enterotome* (Fig. 16) is best for opening the intestines, and is also useful in completing the division of the

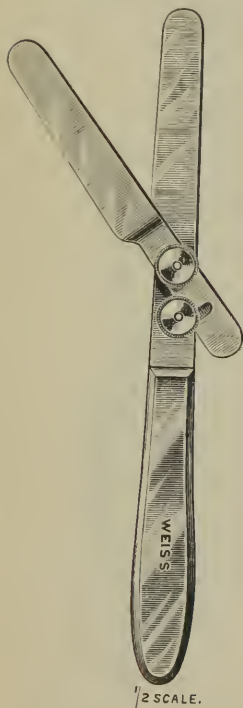


FIG. 12.—Tiemann's double-bladed section knife.



FIG. 13.—Straight sharp-pointed scissors.

heart after its removal from the body. One blade is usually provided with a hook-like pro-

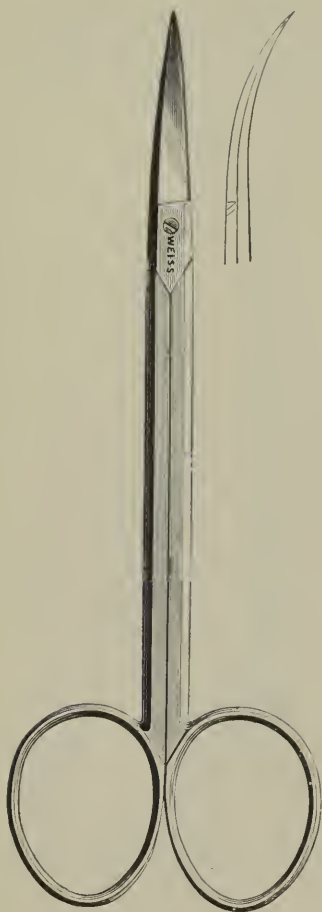


FIG. 14.—Fine curved scissors.

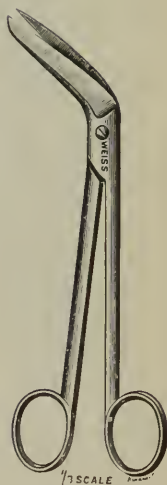


FIG. 15.—Scissors with angular blades.

cess, but when employed for opening the heart this may with advantage be dispensed with, and a pair used with the blade rounded off.

Probe-pointed scissors are very useful for opening up ducts or laying bare vessels (Fig. 17).

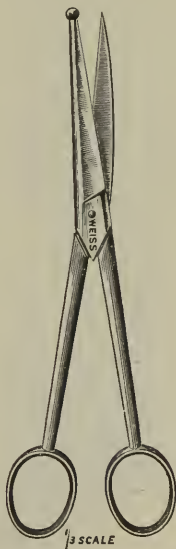
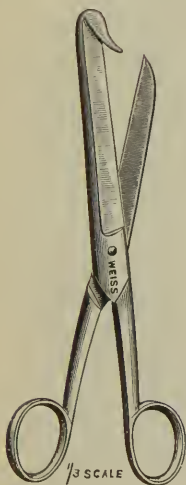


FIG. 16.—Bowel scissors.      FIG. 17.—Probe-pointed scissors.

*Saws.*—A good strong saw is absolutely essential. The best is one very much resembling a butcher's saw (Fig. 18). Indeed, some pathologists prefer an ordinary meat saw. The handle should be so shaped as to be comfortably

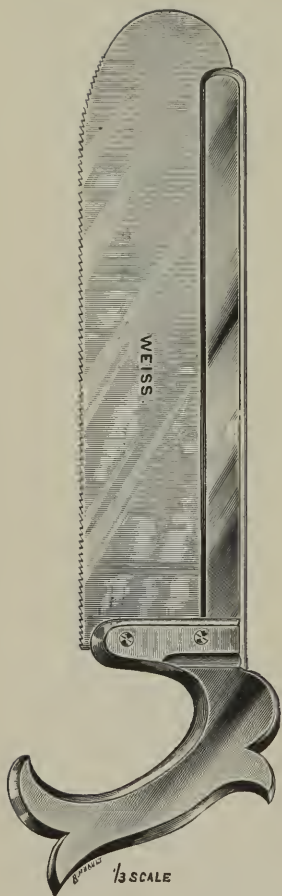


FIG. 18.—Strong saw.

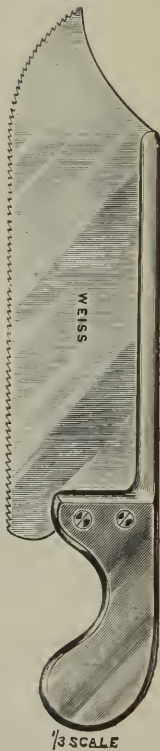


FIG. 19.—Saw.

grasped. Some of the pistol-shaped and somewhat straight handles are inconvenient (Fig. 19).



FIG. 20.—Small hand-saw.



FIG. 21.—Long metacarpal saw.

A small hand-saw, somewhat of the type of Hey's, is occasionally convenient in opening up structures at the base of the skull (Fig. 20).

The long metacarpal saw is also often of service (Fig. 21).

The spinal double saw or *rachiotome* has been

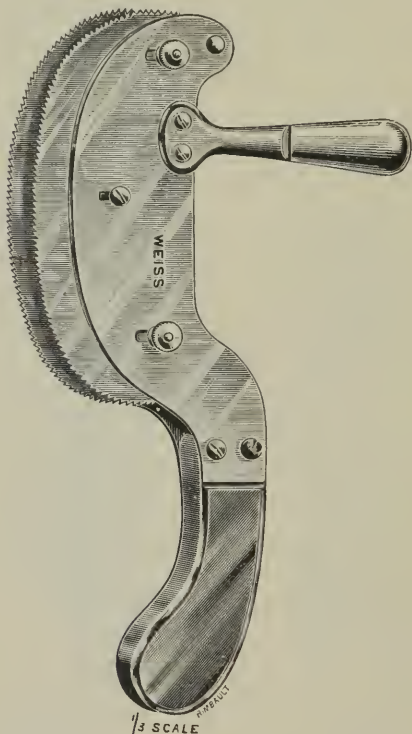


FIG. 22.—Spinal double saw or rachiotome.

devised to facilitate the removal of the spinal cord from the back (Fig. 22).

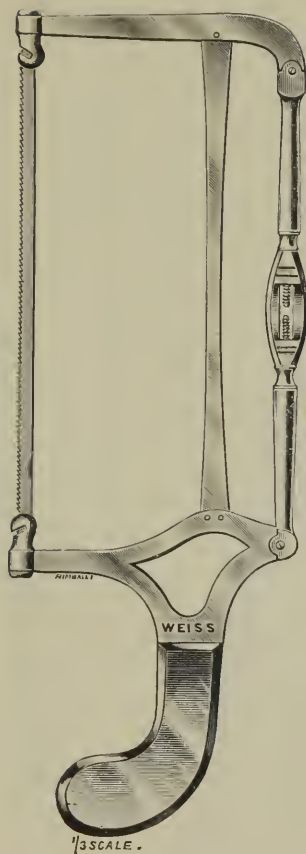


FIG. 23.—Butcher's saw.

A good saw must be strong and with well-set teeth. The blade should be long and with a

rounded or curved end. Sometimes it is desirable to use a saw with a moveable back.

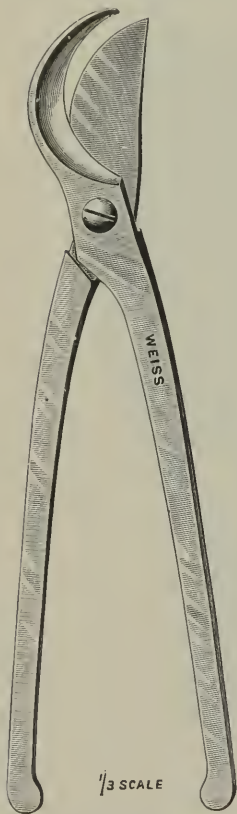


FIG. 24.—Cartilage shears or costotome.



FIG. 25.—Bone-cutters.

Occasionally Butcher's saw proves very useful (Fig. 23).

A band-saw is sometimes handy, and a fine fret-saw is often of service in dissecting the bony structures of the ear.

*Shears.*—Cartilage shears or a *costotome* may be needed for cutting through tough or calcified rib cartilages (Fig. 24).



FIG. 26.—T-shaped chisel.



FIG. 27.—Chisel.

Bone-cutters of strong construction are necessary for dividing calcified rib cartilages and

bones (Fig. 25). *Savage's vertebral forceps* are useful for dividing the arches of the vertebræ by snipping through the laminæ.

*Chisels.*—These are of different forms and are required for several purposes. The most generally useful is that of a T shape (Fig. 26). Straight, guarded, and hatchet-shaped chisels are also used (Figs. 27 and 28). For opening the ver-



FIG. 28.—Straight chisel.

tebral canal by cutting through the pedicles and removing the bodies, large curved chisels have been introduced by Brunetti (Fig. 29). Special *lion forceps* are also needed to grasp the bodies of the vertebræ during removal (Fig. 30). A straight form of the same type of chisel is sometimes used in removing the cord from the back (Fig. 31).

*Hammers.*—For general purposes I prefer a large wooden mallet. A soft iron hammer with wooden handle is also convenient. That usually supplied is made of steel, and has a wedge-shaped end (Fig. 32).

Sometimes a blunt hook is formed at the tip of the handle, serving as a very convenient wrench for tearing off the skull-cap.

**Accessory Instruments.**—*Hooks* such as are

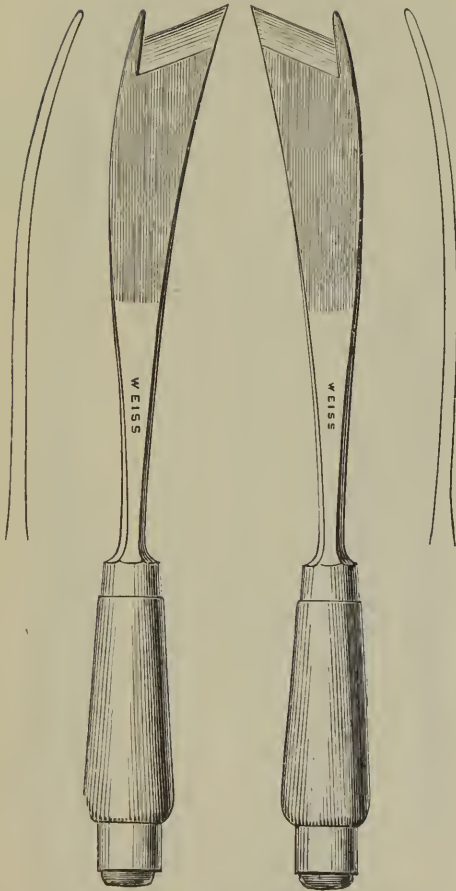


FIG. 29.—Curved spinal chisels.

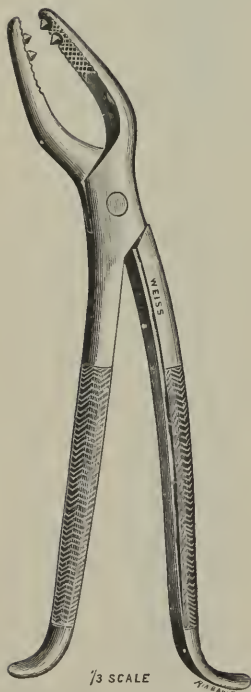


FIG. 30.—Lion forceps.



FIG. 31.—Straight spinal chisel.

supplied in most dissecting-boxes are also sometimes useful (Fig. 33).

*Forceps* of the ordinary dissecting type are,

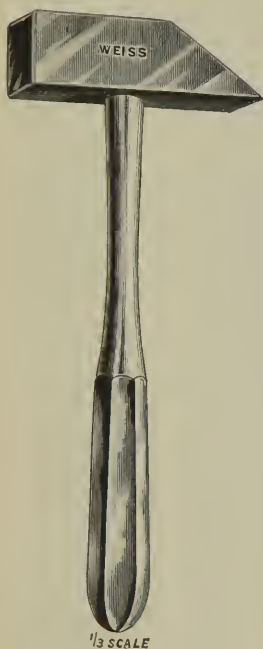


FIG. 32.—Iron hammer.

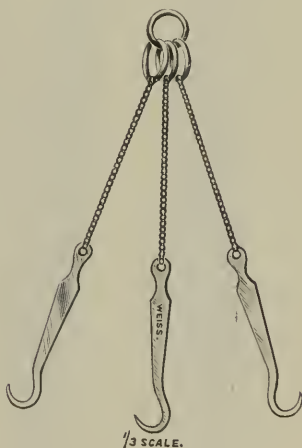


FIG. 33.—Hooks.

of course, desirable where any careful dissection has to be undertaken (Figs. 34, 35, 36).

Hooked *retractors* may also be of service (Fig. 37). *Directors*, grooved and probe-pointed, are



FIG. 34.—Forceps.

FIG. 35.—Straight  
fine-pointed forceps.FIG. 36.—Curved  
fine-pointed forceps.

constantly needed. A metal *blowpipe* may sometimes be required (Figs. 38 and 39), and



FIG. 37.—  
Hooked  
retractor.



FIG. 38.—  
Curved  
blowpipe.

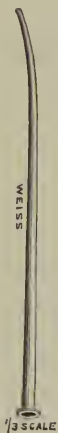


FIG. 39.—  
Straight  
blowpipe.

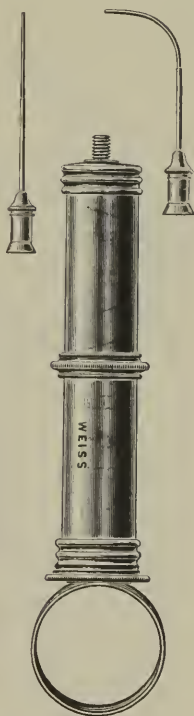


FIG. 40.—  
Injecting  
syringe.

some form of injecting *syringe* should be at hand (Fig. 40).

Some pathologists find a cranium holder or *coronet* an aid in the opening of the skull (Fig. 41).

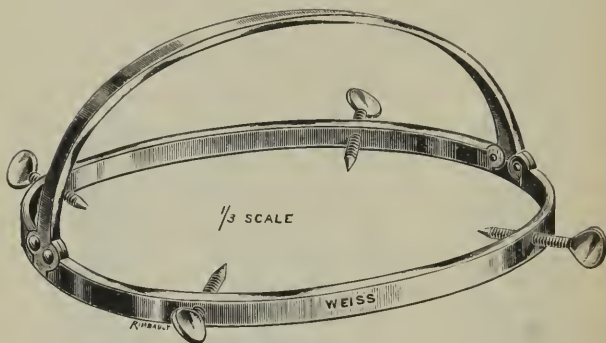


FIG. 41.—Cranium holder, crown, or coronet.

A convenient form of *head-rest* is illustrated in Fig. 42.

*Measures.*—These are absolutely essential, and should be of various kinds. Strong graduated glass vessels are necessary for fluids, while rigid and flexible measures are needed for estimating the size of organs. Graduated callipers are of great service (Fig. 43). A graduated cone is used for estimating the size of orifices (Fig. 44). A complete set of marked cones suitable for the measuring of various kinds of apertures will be found very useful. Some use balls of varying diameter.

A strong *magnifying glass* (Figs. 45 and 46)

fitted in a suitable handle will often be of considerable assistance.

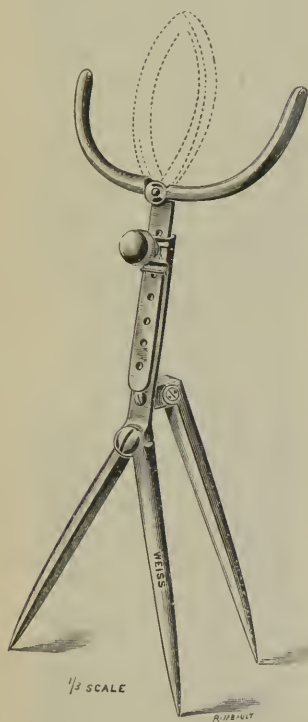


FIG. 42.—Head-rest.



FIG. 43.—Measuring callipers.

Probes, needles (Figs. 47, 48), catheters, copper wire, and strong hempen thread should also be provided.

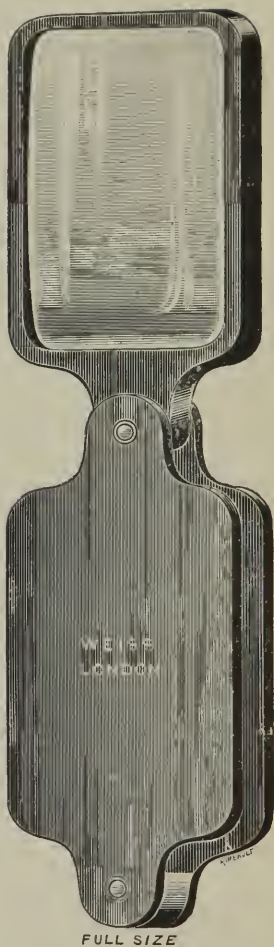
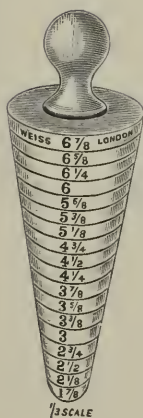


FIG. 44.—Graduated cone.

FIG. 45.—Magnifying lens.

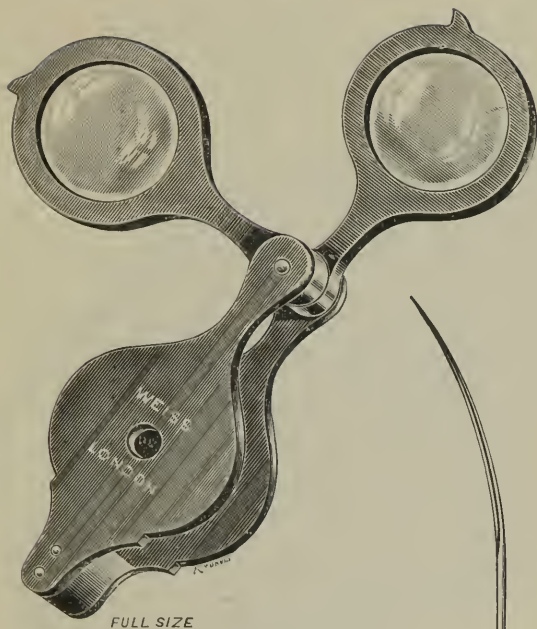


FIG. 46.—Magnifying lens.



FIG. 47.—Curved needles.

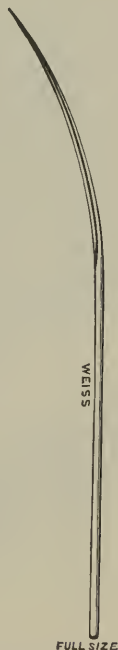


FIG. 48.—Straight post-mortem needle.

Frequently hospitals are supplied with a complete post-mortem set fitted in a suitable

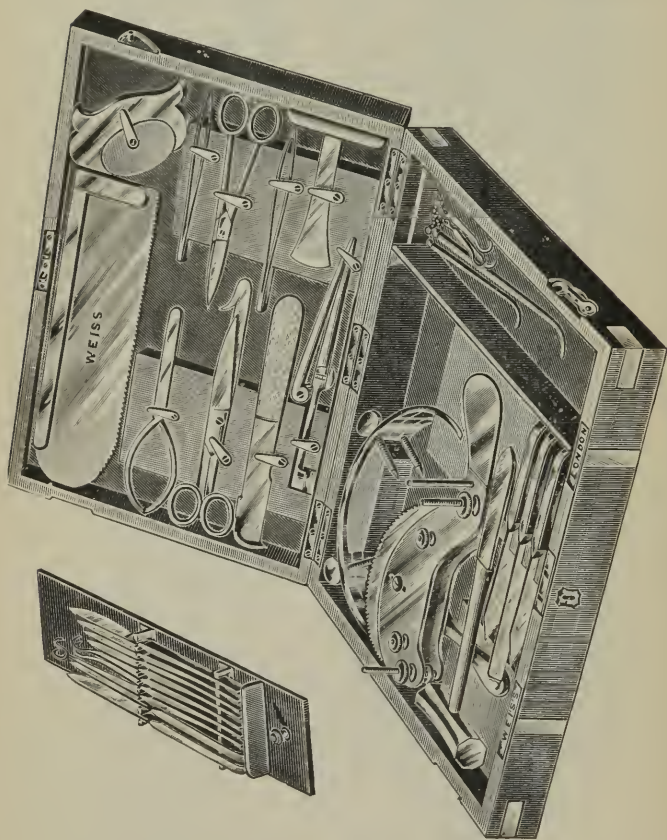


FIG. 49.—Complete post-mortem set.

case similar to that indicated in the accompanying figure (Fig. 49).

In a thoroughly equipped pathological department many other desirable appliances should be found.

The table on which the body rests is usually made of stone or slate. If of wood it should be zinc-lined. A weighing table is an expensive luxury.

A sloping metal table with raised edges, rounded corners, and so supported as to be readily rotated, is, perhaps, one of the most convenient. It is usually made 6 feet long and 2 feet broad, and about 2 feet 9 inches in height.

Thoroughly reliable scales, suitable for weighing the different organs of the body, are of course necessary where post-mortems are made for scientific purposes.

Blocks of wood of heavy and non-absorbent nature are convenient as supports. The one used for the head and neck should be excavated. A wedge-shaped block is necessary for the back when removing the cord according to Brunetti's method.

Boards made of non-absorbent wood are also useful for placing instruments and organs on.

Enamelled trays, similar in form to photographic developing dishes, are very convenient receptacles for the organs as removed from the body.

Scoops of different sizes are often of use in removing fluid from the thorax.

A pair of bellows is of much service for inflating organs like the stomach and intestines.

A drill for making holes in bone is sometimes desired when it is necessary to wire fragments together.

Amongst other desiderata may be mentioned tow, cotton wool, sawdust, sponges, twine, india-rubber tubing, pails, and plenty of disinfectants and deodorants.

A supply of hot and cold water, and also suitable means for disposing of all morbid discharges, will, of course, be always provided in a modern post-mortem room.

Of the absolutely essential instruments, such as knives, scissors, and saw, it is well to have duplicates so that no inconvenience may be experienced when sharpening is necessary.

For examinations in private houses the instruments may be best carried in an old and inconspicuous hand-bag; or a little ingenuity will readily devise a suitable "hold-all," made of such material as may be readily cleansed.

In going to any case which may prove to be one of poisoning, it is well to carry a perfectly clean, stoppered glass bottle, into which the contents of the stomach may be placed. This should be carefully sealed before passing out of the care of the pathologist.

## CHAPTER IV

### EXTERNAL EXAMINATION.

A THOROUGH examination of all external characters should never be neglected. The inspection must be minute and systematic. The same methods may be used in both scientific and medico-legal cases. In the former a detailed report is, of course, desirable, and in the latter it is of the greatest importance that nothing be overlooked. A hasty or cursory examination in medico-legal cases may lead to difficulties and discomfiture.

**Time of Examination.**—It would be well if examinations could be made as soon after death as possible. Public opinion is against early internal inspection; in some countries at least twenty-four hours' interval is insisted on. There is, however, no reason why an early external examination should not be made in most cases.

**Preservation of the Body.**—It is very desirable that, prior to the making of the post-

mortem examination, all bodies should be kept in a specially constructed cold chamber.\*

It may be well to add here that in cases where no such refrigerating appliance is available, and it is necessary to preserve the body from putrefactive changes until consent for the examination can be obtained, the corpse should be closely surrounded by ice. Where it is desirable to preserve the cord in a fit state for microscopical examination, and the autopsy cannot be undertaken speedily, the body may with advantage be kept in the prone position and ice applied along the back.

**Use of Photography.**—Photography is a valuable means of permanently recording external characters, and in medico-legal work especially it may be of the greatest service.

**The Body and its Environment.**—An external investigation can be divided into two parts:

1. Examination of the body.
2. Examination of its environment.

In many cases there is no opportunity for thoroughly investigating the relation of the body to its surroundings, and friends or law officials not infrequently remove the body before the medical man is summoned. In large towns and cities cases “found dead” are usually

\* For illustrations and description of the refrigerating apparatus in use at the London Asylums Laboratory at Claybury, in Essex, see ‘Brit. Med. Journ.,’ Feb. 18th, 1899.

brought direct to hospital or taken to a public mortuary.

When summoned to examine a body as originally found, the pathologist should carefully note all points of importance in connection with the surroundings, and examine particularly for the established signs of death. Remember the possibility of trance.

When several bodies are found together it may be necessary to form an opinion as to which died first, and in what way they influenced each other in producing death.

Where possible measurements should be taken. The ground must be carefully examined for evidences of a struggle. Footprints must be inspected, and it may be desirable to direct that they be photographed or casts taken of them. The extent and direction of blood marks must be observed. A search should be made for weapons, or bottles which may have contained poison. The sense of smell must not be neglected. The posture and expression of the corpse may be suggestive.

**Preservation of Material.**—It is always well to have a number of small bottles or well-corked glass tubes at hand, into which can be placed portions of dust, dirt, stains, or like matter which may be found on the clothes or about the body. The dirt taken from beneath the fingernails has been known to afford important evidence in a medico-legal case. Portions of the

soil, if stained with blood or other discharges, should be preserved.

**Examination of the Hands.**—These should be examined in all cases with special care. The character and position of rings or marks of such should be recorded. Oftentimes the hands afford valuable information respecting the occupation, social position, possible duration of illness, and sometimes even the essential nature of the morbid processes leading to death.

**Inspection of Clothes.**—The clothes should in all cases be carefully examined, as they often give important clues to the social position or occupation of the deceased. The contents of the pockets must be examined and handed over to an officer of the law, after noting such points as shall enable them to be readily recognised again in court if necessary. Any disordered condition of the clothes or presence of blood marks or other stains must be recorded.

**Taking of Notes.**—Full notes must be taken at the time of examination. More than one medical man should always be present at a medico-legal inspection; and when two are examining together it is much the most convenient way for one to dictate the notes to the other, both of course agreeing with the individual details of the report.

**History of the Case.**—It is always well to know as much as possible about the history of the case before commencing the examination. Fre-

quently, however, the attendants and police have been directed to give no information. In any case the investigation must be undertaken in an impartial spirit and with an unbiassed mind. The whole examination must be made deliberately, in no hurry, and with the full determination that the notes shall be complete and minute, but expressing no opinions and innocent of any generalization.

**Divisions of the External Examination.**—The external examination of the body may be divided into three parts:

1. Examination of normal characters.
2. Examination of morbid features.
3. Examination of post-mortem conditions.

**Examination of Normal Characters.**—Details as to the normal characters are of importance chiefly for purposes of personal identification.

The chief points to be noted relate to race, sex, age, stature, weight, girth, attitude, expression, colour, and development. Generally one can form a fairly correct opinion as to the occupation and social position of the deceased. In females the condition of the breasts and genitals should be examined, and the presence or absence of the hymen ascertained.

**Examination of Morbid Features.**—The examination for pathological characters is, of course, of extreme importance. Every deviation from the normal must be recognised. In medico-legal cases the lesion should be de-

scribed in simple and, as far as possible, non-technical language. Terms indicating processes are usually to be avoided. Opinions must not be allowed to replace facts in an official medico-legal report.

The following are among the chief morbid features which should be looked for:—mal-developments either by excess, defect, or perversion; nutritional changes as evidenced by alterations in the quantity and colour of the hair, number of the teeth, “arcus senilis,” corpulence or wasting; abnormal pigmentation and tattooing; scars and atrophic lines; hairy moles, *nævi*, growths, cutaneous eruptions, or special skin affections. The size and shape of the pupils should always be noted. Wounds, contusions, or other evidences of injury should also be carefully looked for. Always examine the bones and joints for fractures and dislocations. The hands should particularly be examined. Cyanosis, dropsy, or hæmorrhage into the skin may suggest some important internal lesion or general disease. Hernia and enlarged glands must be noted if met with. The various orifices must be inspected for discharges or for foreign bodies. Morbid odours may sometimes lead to important conclusions.

Do not forget to look for parasites, and if present, do not omit to mention them in the report. They may have important bearings in a medico-legal case.

In some instances it may be well to make "cover-glass" preparations of doubtful discharges. Sometimes it is most convenient to spread the same on microscopic slides. Blood, serum, and fluids should generally be collected and preserved for a time in sterilized pipettes. In the investigation of microbial diseases tubes containing suitable culture media should be at hand.

**Post-mortem Conditions.** — Post-mortem conditions must always be clearly distinguished from ante-mortem lesions. In medico-legal investigations this is of supreme importance.

In every case the ordinary evidences of death should be looked for—cessation of the animal functions, alteration in the cornea, flaccidity of the sclerotic, lowered temperature, pallor of skin, and the like.

The question of post-mortem rigidity may sometimes afford valuable evidence as to the time of death, and should always be carefully recorded. It is well to make sure that the rigidity has not been broken down by the attendants in moving the body or removing the clothing.

Much caution is necessary in expressing any opinion as to the time that has elapsed since death. Consider well the conditions which hasten and delay the occurrence of rigor mortis, post-mortem lividity, and putrefaction.

The presence, size, shape, and situation of post-mortem lividities should always be recorded.

Post-mortem staining must not be confounded with contusions. Simple dirt has been mistaken for a bruise. Use sponge and water if there is any doubt. Cadaveric lividities must not be confused with areas of discoloration due to putrefaction; they occur before decomposition begins, and are due to stagnation and gravitation of the fluid blood in the capillaries and vessels, with loss of tone in the vessel walls. The chief distinctions between post-mortem stains and ante-mortem bruises may be briefly indicated in the following table:

	<i>Post-mortem staining.</i>	<i>Ante-mortem contusion.</i>
Occurrence	4—12 hours after death	Before death
Seat	Dependent parts, except when pressed upon	Anywhere; at point of injury.
Shape	Irregular	Irregular, corresponding to agent inflicting injury.
Margin	Well-defined	Ill-defined, zones of colour around edge.
Colour	Dull red and purple	Variable: purple, violet, green, yellow, lemon.
Extent	May form large areas	Usually more or less limited.
Elevation	None	More or less raised.
Cuticle	Unaffected	Often injured.
Incision	No effused blood. Blood in dilated vessels of rete mucosum	Effused blood into true skin and subcutaneous tissues.

Putrefaction may be evidenced by discoloration, distension of the abdomen or emphyse-

matous-like formations in the skin and subcutaneous tissues, and its seat, extent, and character should be indicated.

The temperature of the chamber in which the body has been kept and the manner of its protection should also be investigated.

It is unnecessary to enter here into details concerning the above-mentioned points, as they are fully dealt with in most of the manuals of forensic medicine.

## CHAPTER V

### INTERNAL EXAMINATION

**General Considerations.**—The internal examination of the body must always be conducted in a systematic manner. While, however, adopting a definite method of procedure, a pathologist must ever be ready to modify, amplify, deviate from, or even altogether alter his usual plan, so as to meet the particular needs of any special case.

**History of the Case.**—If possible the clinical history of the case should be ascertained before the examination is commenced, so that suitable precautions may be taken where necessary. Thus in some instances it may be desirable to arrange for the collection and speedy examination of fluids, or the cultivation of organisms. Cases of supposed pneumothorax or pneumo-peritoneum should be specially investigated before proceeding to open the cavities according to the usual methods. Occasionally, especially in examinations for scientific purposes in private houses, it may be de-

sirable to draw off fluids from the pleural and peritoneal cavities by means of a trocar and cannula, or by an india-rubber tube, before opening these cavities.

**Post-mortem Conditions.**—Special care must be taken not to confound post-mortem changes with true morbid conditions. The time since death should always be ascertained, and the temperature registered of the mortuary or place where the body has been kept.

**Medico-legal Cases.**—Particularly in medico-legal cases the examination must be complete. In suspected poisoning not only must the stomach and its contents be preserved, but portions of other organs should be kept for analysis.

**Exhumation.**—In cases of exhumation persons capable of identifying the body must be present. Photographs should be taken when possible.

**Disposal of Infectious Material.**—Disinfectants and deodorants must never be used during the course of an autopsy. In all infectious cases such as typhoid, tuberculosis, and the like, precautions should be taken that all discharges and dejecta are suitably disposed of immediately after the examination is completed.

**Order of Examination.**—According to the routine method, the parts of the body are investigated in the following order:—abdomen, thorax, neck, head, spine, and limbs.

Not infrequently one has to be content with a limited examination. Permission is sometimes only granted for the opening up of an abdominal incision, but even in these cases the greater part of both thorax and abdomen may be explored.

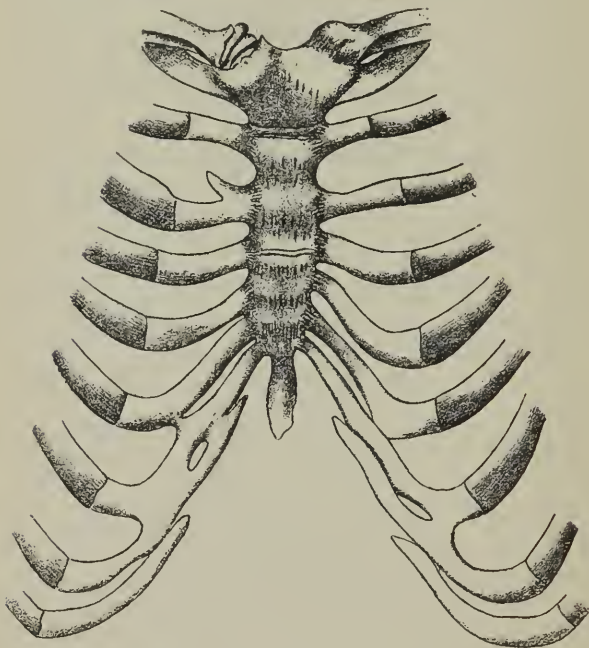


FIG. 50.—Sterno-clavicular articulation, ribs, and cartilages, indicating part which must be removed to expose thorax. (Virchow.)

In a large number of cases in this country the head is not opened, either because permis-

sion is not obtained or no evidences of affection of the brain have been noted during life. When possible a thorough examination should always be made. In medico-legal cases it is well to remove the calvarium and examine the meninges before the body, as, if the heart be opened or the large vessels of the neck divided first, some of the blood may escape from the cranial cavity.

Where the spinal cord is to be removed from the back, it is usually most convenient to perform this part of the examination before proceeding to open the body. If the cord is taken out according to Brunetti's method, the viscera must be removed first.

**Preliminary Incisions.**—The operator should always stand on the right side of the cadaver. The *primary or long anterior incision* starts at the lower border of the thyroid cartilage, and extends to the pubes. Sometimes it is allowable to commence the incision below and behind the symphysis of the jaw. It should never be extended on to the chin. The knife must be firmly grasped, and so held that a clean cut is made with the belly of the blade. In the neck the cut is extended through to the subcutaneous tissue. Over the sternum the incision is carried down to the bone, but over the abdomen it reaches only to the muscular coats and the subperitoneal fat.

The opening of the abdomen is made by pinching up the peritoneum and subperitoneal tissue

immediately below the ensiform cartilage, and making a small nick into the abdominal cavity. Note if air or fluid escapes. The small aperture is enlarged and the first and second fingers of the left hand introduced. Separating the fingers an incision is made between them and prolonged downwards, the traction on the abdominal wall made by the fingers together with the pressure of the back of the fingers on the underlying abdominal structures preventing any damage to the intestines. The attachment of the recti to the pubes is to be divided by carrying the knife outwards on each side at the lower end of the abdominal incision, but not extending through the skin.

Occasionally a further incision is made into the rectus on either side, a little below the level of the umbilicus, taking care, of course, not to continue the cut into the skin.

The **thorax is now to be opened** and a wider view given of the abdominal cavity. Hold the right abdominal flap firmly in the left hand and draw it forwards and outwards. With long sweeping cuts divide the attachments of the muscles to the lower ribs and cartilages. Extend the cuts upwards, detaching pectoral muscles and removing all structures, so as to leave sternum, ribs, and cartilages cleanly exposed. Hold the left abdominal flap outwards and clear in similar manner. Now proceed to remove the "operculum." Disarticulate at the

sterno-clavicular joints. Cut through the rib cartilages with a strong cartilage knife. Hold the blade a little obliquely and cut backwards and outwards near the costo-chondral junction.

Generally the section of the rib cartilages is begun at the second. The disarticulation of the sterno-clavicular joints and division of the first ribs may be undertaken from the outside or started from the internal aspect as may seem most convenient. It is much better to always disarticulate the manubrium sterni rather than saw or break across the bone as is sometimes done. The first rib cartilage is often calcified, and has to be divided with bone forceps. Remember the first costal cartilages must be divided further out than is necessary for the second rib. Cut through muscles and soft structures. Carefully separate the attachment of diaphragm, cutting on to the bone and cartilage (Fig. 50).

A consideration of the methods for *opening the head* may be best deferred until the examination of the brain is described.

**Method of Investigation.**—Before proceeding to consider the steps in the examination of the structures exposed, it may be well to remind the student of the words of Orth: "The chief requisite of every exact post-mortem examination is this, that no part shall be removed from its position until its relations to the surrounding parts are established, and that no part shall be

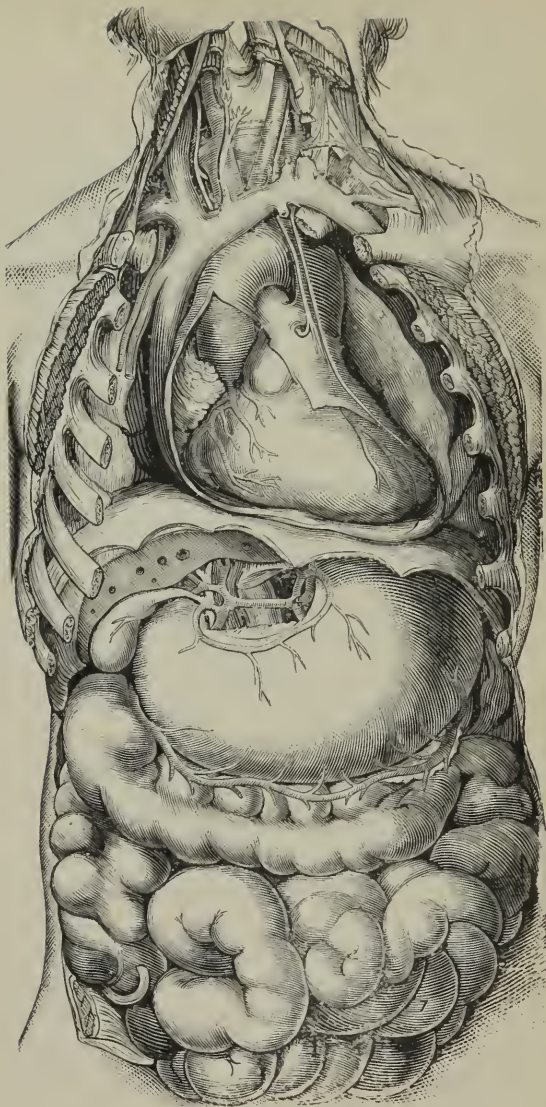


FIG. 51.—Superficial inspection of thorax and abdomen.  
(Heath.)

taken out by whose removal the further examination of other parts is affected.”

**Inspection.**—Before any parts are touched each cavity must be carefully inspected. Any alterations in the position, size, shape, and colour of the contained viscera are to be noted. The height of the diaphragm must be ascertained. Note the form and situation of growths if present. Observe also the relation of the lungs to the pericardium, and the degree of distension of the different parts of the gastro-intestinal tract. Note also the extent and colour of the fat in the omentum and mediastinum. Observe if any of the cavities are unduly distended, or if there be any accumulation of fluid (Fig. 51).

Occasionally transposition of the viscera is met with (Fig. 52).

**Palpation.**—Pass the fingers over the diaphragm. Draw down the great omentum and pass the hand over and around the stomach. Let the whole of the intestinal tract be carefully handled. Palpate out the liver, spleen, pancreas, and kidneys, noting alteration in size, shape, position, and mobility. Examine for adhesions. Let the pelvis be thoroughly explored. Carefully palpate the mediastinum and pleuræ.

**Incisions.**—In some cases it is desirable to make incisions into the organs before removing them from the body. This is particularly the case with the heart. Often the stomach and urinary bladder are opened *in situ*. The exact

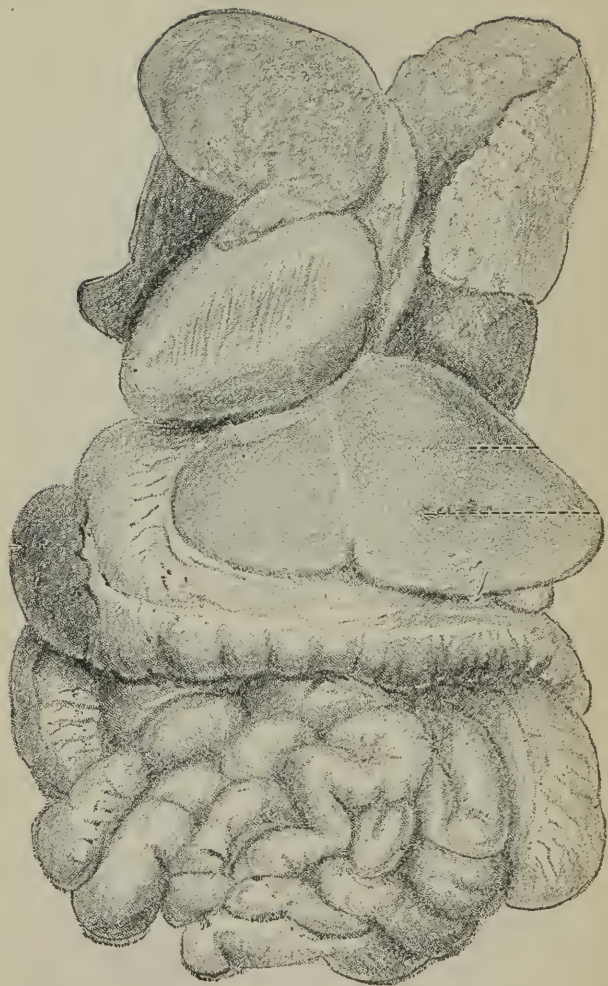


FIG. 52.—Transposition of viscera. (Norman Moore.)

methods by which this part of the examination may be best accomplished will be subsequently described when the examination of the respective viscera is under consideration.

**Removal of Organs.**—In order to satisfactorily investigate the various organs it is generally necessary to remove them from the body. This is often done separately. Not infrequently it is well to take them in association. Thus in connection with such lesions as mediastinal growth, intra-thoracic aneurysm, and œsophageal cancer, it is best to take the whole of the thoracic organs together, leaving their separation from each other until their exact relationship shall have been made out. Sometimes, especially in poisoning cases, it is well to take out the whole of the gastro-intestinal tract without separating it from the œsophagus. In many genito-urinary affections the parts are best removed together.

## CHAPTER VI

### EXAMINATION OF THORAX AND NECK

**General Considerations.**—The thorax having been opened the investigation of the thoracic organs is to be proceeded with. A thorough examination by *inspection* and *palpation* must always precede any *special dissection*. Recent or slight adhesions may then be torn through, but if firm must be carefully divided with the knife, cutting in the case of pleural adhesions away from the lung towards the ribs and cartilages. In some cases it may be best to strip off the parietal layer of the pleura from the ribs.

In children under about two years of age the thymus will be distinctly seen. Before proceeding to remove any organ give particular attention to the mediastinal structures, and thoroughly explore the root of each lung. In many cases it is best, as already indicated, to remove the whole of the thoracic organs together in one piece, and complete the dissection of the parts outside the body.

**Opening of the Pericardium.**—Pick up the

wall of the pericardial sac with the thumb and forefinger of the left hand, and open by

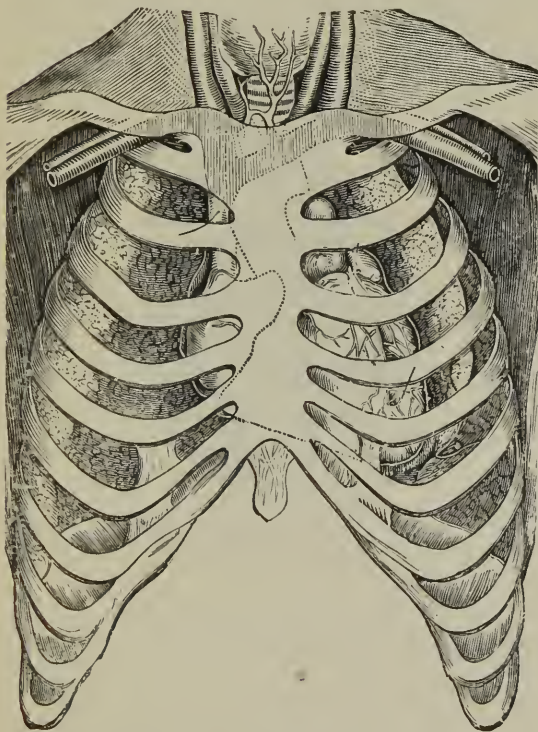


FIG. 53.—Diagram of the relations of the heart and great vessels to the wall of the thorax. The lungs are drawn aside. (From Luschka.)

making a small snip with the scissors. Extend the incision vertically and make a second cut

outwards and downwards towards the apex of the heart. Examine the nature and measure the amount of any effusion present. Inspect the serous coat for evidences of pericarditis, localised fibrosis, adhesions or hæmorrhages (Fig. 54).



FIG. 54.—Heart from a case of purpura hæmorrhagica, showing numerous small subepicardial hæmorrhages. Anterior surface.

“Milk patches” are frequently situated over the anterior and posterior surfaces of the right ventricle. When adhesions are universal, they may sometimes be broken down with care, but it may be necessary to cut through them in order to open the cavities of the heart. Often considerable subepicardial deposit of fat is present.

When blood is found in the pericardial sac

search carefully for the source of the hæmorrhage before proceeding to remove the heart.

Occasionally secondary nodules of growth are met with projecting from the visceral layer of the pericardium (Fig. 55).

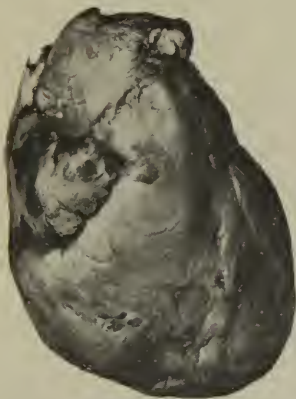


FIG. 55.—Heart, showing numerous secondary deposits of melanotic sarcoma.

**Examination of the Heart.**—There are several methods by which the heart may be conveniently investigated. Some prefer always to open it *in situ*, while others only do so after removing it from the body. As a general rule, it is best to examine the cavities and orifices while the organ is in position (Figs. 56, 57).

*Order of Investigation.*—A systematic investigation of the heart will necessitate—1. Inspec-

tion, palpation, and measurement *in situ*. 2. Opening of cavities and careful palpation of auricles, ventricles, and orifices. 3. Removal of the heart from the body. 4. Testing of valves. 5. Minute examination of valves, cavities, and walls. 6. Dissection of coronary arteries.

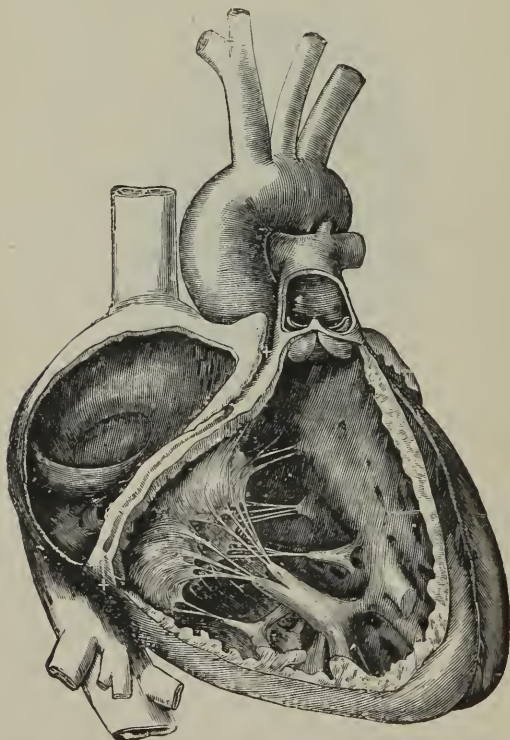


FIG. 56.—Interior of right auricle and ventricle exposed by the removal of a part of their walls. (Allen Thomson.)

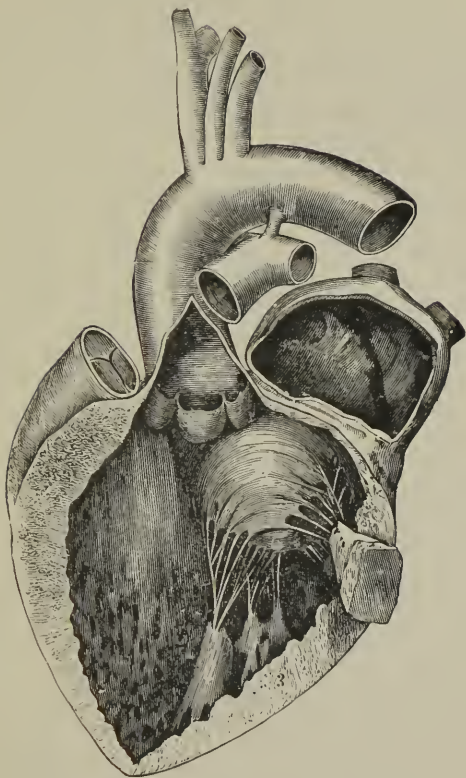


FIG. 57.—Interior of left auricle and ventricle, exposed by the removal of a part of their walls. (Allen Thomson.)

*Lines of Incision.*—The opening of the heart *in situ* is best done by making an incision into each cavity separately. The different methods

by which this can be accomplished can only be satisfactorily learnt by actual demonstration in the post-mortem room. The right auricle is opened by an incision extending from just above the auriculo-ventricular groove outwards to a point midway between the entrance of the superior and inferior vena cava. The right ventricle is to be incised along its right border. The cut into the left auricle starts just above the coronary sinus, and extends to a point between the entrance of the left superior and inferior pulmonary veins. The left ventricle is opened along the left border of the heart.

There are two principal ways in which this opening of the chambers of the heart *in situ* may be accomplished.

1. The best and easiest method is as follows:—Pick up the heart with the left hand, the fingers behind and the thumb in front of the apex. Draw the heart forwards and to the left, so that the left border rests against the cut edge of the rib cartilages and the border of the right ventricle; the whole of the right auricle and points of entry of the venæ cavæ are thoroughly exposed (Fig. 58). Plunge the knife obliquely into the right auricle immediately above the auriculo-ventricular groove, and cut outwards between the superior and inferior vena cava. Then open the right ventricle along its right border, taking care to insert the knife obliquely

so as not to injure the septum. After investigating the contents of the cavities and the size of the auriculo-ventricular orifice, drop the organ back again into its normal position.



FIG. 58.—Method of holding the heart over the edge of the divided left costal cartilages. Dotted lines indicate situation of incisions into right auricle and right ventricle.

Now pick up the organ in such a manner as to bulge out its left border. With thumb behind and fingers in front of the left ventricle draw the heart over the cut edge

of the right costal cartilages (Fig. 59). Open the left auricle by a cut extending from immediately above the auriculo-ventricular groove outwards between the entrance of two of the



FIG. 59.—Method of holding the heart over the edge of the divided right costal cartilages. Dotted lines indicate situation of incisions into left auricle and left ventricle.

pulmonary veins. Then incise the left ventricle along the prominent left border, inserting the blade obliquely so that the septum shall not be injured.

2. A less convenient method, and one usually at first perplexing to the student, is as follows:—With the right hand rotate the heart so that its right border presents anteriorly. Slip the extended fingers of the left hand beneath the heart, around the left border, until the fingers cover the anterior surface, and allow the thumb to rest on the posterior surface. Grasp the organ firmly. The right border, the only part uncovered, is thus made to bulge and project prominently forward. The incisions are then made into the right auricle and right ventricle. Now drop the heart back into position. To expose the left side pick up the heart with the left hand, the first two or three fingers on the anterior aspect of the heart and the thumb on the posterior surface. Grasp the organ firmly and pull it to the right side of the body. The left auricle is thus well exposed, and the left border of the left ventricle rendered prominent. Make incisions into the left auricle and left ventricle.\*

Not a few pathologists prefer to open the cavities of the heart after its removal from the body. In accomplishing this some use scissors, others use a knife. Both instruments may advantageously be employed.

In many cases the pulmonary artery should be slit open as far as its bifurcation before removing the heart from the thorax. Unless this

\* For figures illustrating this method see 'Post-mortem Handbook,' by Dr. Thomas Harris, 1887, pls. iii and iv.

be done a thrombus may be readily overlooked or displaced.

*Examination of the Valves.*—Whatever method be employed care must be taken not to injure the auriculo-ventricular valves or the septum. The size of the tricuspid and mitral orifices is



FIG. 60.—Aneurysm of the mitral valve.

often roughly estimated by inserting the finger tips, being careful not to detach any vegetations or inflict injury to the valve segments. The tricuspid orifice normally admits three finger tips of ordinary size, the mitral orifice two.

The examiner should be acquainted with the size of his fingers, measured separately and also together, so that he may have a fairly accurate and convenient gauge always at hand.

Measuring by means of graduated cones is to be preferred, as being far more accurate and scientific.

*Removal of the Heart.*—In removing the heart from the thorax hold the organ up by the septum and cut through the vessels close to the pericardium. All clots may now be removed and the organ weighed.

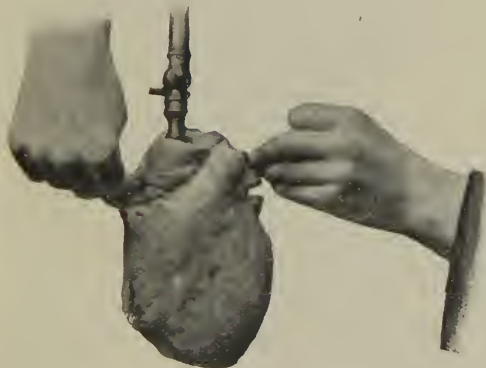


FIG. 61.—Illustrating method of testing competency of aortic valves by means of stream of water.

*Testing the Valves.*—It is customary to test the competency of the pulmonary and aortic valves by means of the “water test,” but this method is far from satisfactory (Fig. 61).

Some pathologists have advocated the testing of the competency of the cardiac valves by inflation with air.\*

*Dissection of the Heart.*—After the heart has been removed from the body place it on the dissecting slab, with the anterior surface upwards and the base towards the operator. Join the incisions in the right auricle and right ventricle by means of the “bowel scissors” (best constructed for this purpose without the customary spike) (Figs. 62, 63, 64).

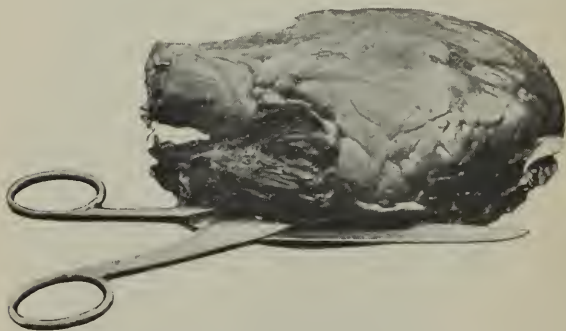


FIG. 62.—The position of the scissor blades before the right auriculo-ventricular ring is divided.

In the right ventricle a cut is to be made starting about the middle of the incision in the right border, passing above the insertion of the anterior papillary muscle and along the side of the septum into the pulmonary artery (Figs.

\* Hamilton, ‘Text-book of Pathology,’ 1889, vol. i, p. 9.



FIG. 63.—Illustrating the method of joining the incisions in the right auricle and right ventricle by dividing the auriculo-ventricular ring by means of the "bowel seissors."



FIG. 64.—The right side of the heart exposed after the incisions into the right auricle and right ventricle have been joined by dividing the right auriculo-ventricular ring with the bowel seissors.

65, 66). The incision may usually be carried between two of the cusps of the pulmonary artery, if the division is made immediately behind a little ridge of fat which is generally present along its left side.

The incisions in the left auricle and left ventricle are to be joined in a manner similar to those on the right side. This is most con-



FIG. 65.—Opening of the pulmonary artery by means of the bowel scissors.

veniently done by passing the blade of the bowel scissors into the left ventricle and through the mitral orifice into the left auricle. In cutting take care to preserve the valve segments as far as possible.

Where there is mitral stenosis it is best not to divide the valve.

An incision may now be carried upwards along the anterior wall of the left ventricle, keeping close to the septum, into the aorta. The line of section should be carried between two of the aortic cusps. This may easily be accomplished by looking from above or viewing from below,

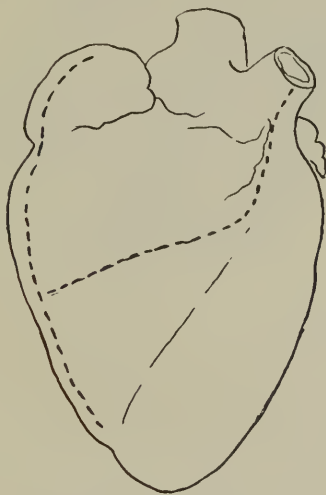


FIG. 66.—Dotted lines indicate incisions into right side of heart and across anterior wall of right ventricle into pulmonary artery.

and arranging that the blade of the scissors or the edge of the knife be kept immediately between two of the segments.

If it is not necessary to preserve the sigmoid

valves of the pulmonary artery, a convenient guide is obtained by cutting along the curved line of attachment of the pulmonary cusp

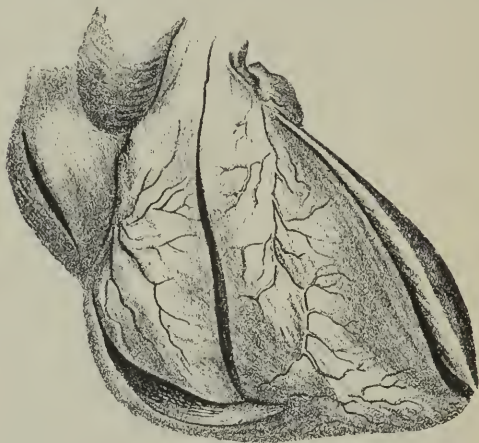


FIG. 67.—Heart showing incision adopted by some pathologists in opening up pulmonary artery. (Virchow.)

nearest to the septum and between two of the pulmonary cusps into the aorta (Fig. 68). If this indication is followed, it will be found that the aortic valves have been opened out without injuring the individual segments.

Occasionally it is convenient to open the ventricular cavities by transfixion (Fig. 69). The blade of a long and sharp-pointed knife is plunged into the posterior surface close to the septum, and brought out anteriorly near the septum. The cut is then made towards the

apex. This is, of course, done on both sides of the heart, so opening up each ventricle.

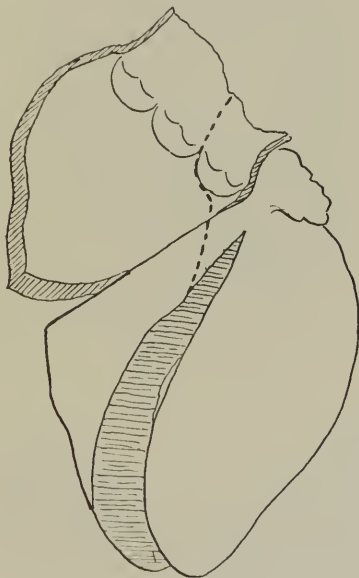


FIG. 68.—Illustrating line of incision along anterior wall of left ventricle into aorta, cutting between two of the pulmonary cusps.

In case of hypertrophy or considerable cardiac enlargement (Fig. 70) transverse sections of the ventricle form a very admirable way of indicating the variation in size and alteration in shape. Such sections are often useful for museum or teaching purposes (Fig. 71).

In certain conditions special methods of examination may be necessary. In such lesions as thrombosis of the pulmonary artery or vena cava, aneurysm of the aorta or congenital mal-

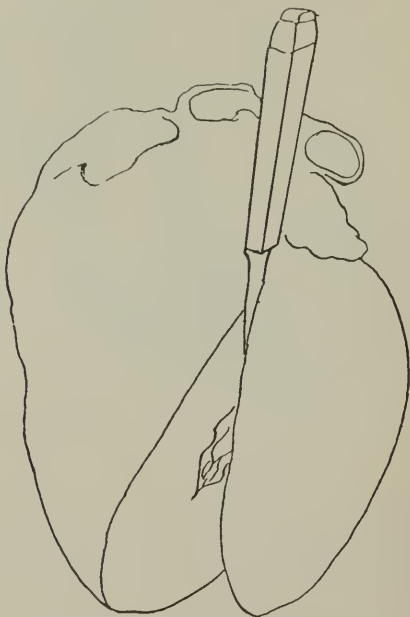


FIG. 69.—Opening of ventricle by transfixion with long-bladed knife.

development of the heart and vessels, it may be well to dissect the parts *in situ*, or remove the thoracic contents in one piece before separating the individual parts.



FIG. 70.—Hypertrophied heart, from a case of chronic interstitial nephritis.

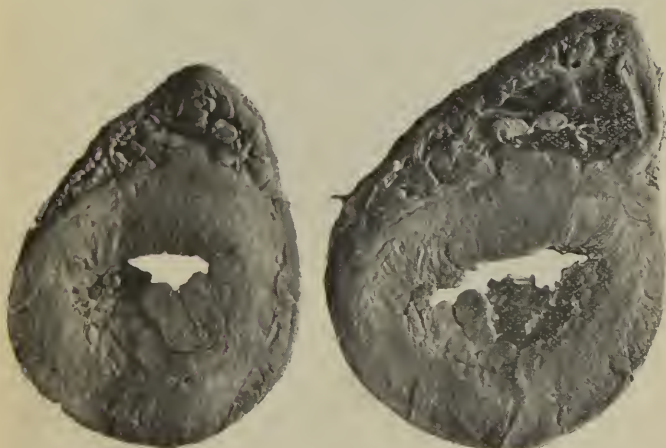


FIG. 71.—Transverse sections through the ventricles  
From a case of hypertrophy secondary to "granular"  
kidney.

In all subjects the interior of the heart must be submitted to a minute examination. Special attention must be given to the condition of the valves. The size and shape of the cavities and alterations in the consistency and appearance of the myocardium must be noted (Fig. 72). The orifices of the coronary arteries must be carefully observed, and the vessels slit up with

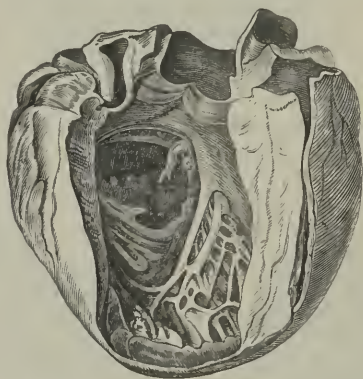


FIG. 72.—Aneurysm of the left ventricle. (Sieveking.)

probe-pointed scissors or a knife and fine grooved director or probe-pointed bistoury.

**Examination of the Thoracic Aorta.**—The aorta must be exposed in its whole course. If involved by aneurysm or extensive atheroma, it is best to remove it in association with the heart. In such cases it should not be opened before being taken from the body. It can be readily slit

up on its posterior aspect by means of strong probe-pointed scissors. In all cases of aneurysm, and especially in the rare cases of dissecting aneurysm, considerable care must be taken not to cut into the morbid parts until they



FIG. 73.—Atheromatous aorta presenting orifice of aneurysm immediately above “intermediate” cusp of the aortic valve.

are fully explored, and their exact relations clearly ascertained.

Particular attention should always be given

to the first part of the aorta and the region of the arch (Fig. 73).

Specially note the condition of the vessel in the neighbourhood of the orifices of the coronary arteries.

**Examination of the Pleural Cavities.**—The pleuræ will already have been thoroughly investigated by palpation, and as far as is possible

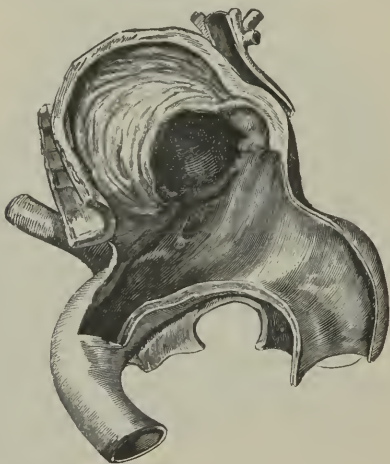


FIG. 74.—Aneurysm of the arch of the aorta containing laminated clot. (Sieveking.)

at present by inspection. In cases of supposed pneumothorax, before the thorax is opened a pouch should be made over the ribs by means of the skin flap and filled with water. On making a small aperture into the pleural cavity,

air, if present, will bubble up through the water. The amount of any fluid effusion should be carefully estimated. Adhesions when tough must be cut. Note any areas of localised thickening. In all cases of death from respiratory obstruction, such as hanging, suffocation, and the like, examine for small petechial hæmorrhages. Miliary tubercles are often distinctly seen on the pleura.

In cases of pneumothorax from rupture of the lung substance gently inflate the organ under water by means of a pair of bellows. The perforation will then be easily detected.

**Examination of the Lungs.**—This necessitates the following stages:—1. Inspection and palpation *in situ*. 2. Removal from the body. 3. Making of sections. 4. Dissection of bronchi. 5. Special examination.

*Removal of the Lungs.*—Generally it is best to remove the lungs together with the respiratory passages and often with the rest of the thoracic contents. When removed separately, the root is grasped by the left hand with the fingers astride the bronchus. Each organ is drawn forwards and downwards, and the primary bronchus cut through immediately behind the fingers.

*Incision of the Lungs.*—The principal incision consists of a long, straight, deep cut from apex to base along the outer border, extending through the lung substance and leaving the

halves hinged at the root (Figs. 75, 76). Other parallel cuts may be made as required.

In examining the lungs, note particularly the size, shape, colour, weight, and consistency.



FIG. 75.—Illustrating method of holding lung in making section into organ.

In pneumonia, tuberculosis, gangrene, abscesses, and other special lesions of the lungs,

particular forms of examination will be necessary (Fig. 77).

The medico-legal investigation of cases of atelectasis in still-born children necessitates such particular attention as is indicated in the text-books of forensic medicine.

In many cases it is well to delay incising the lung until it has been hardened in formalin.



FIG. 76.—Showing method of incising lung.

This can be accomplished in a day or so, and satisfactory sections can then be easily made (Fig. 78).

The bronchi are best divided by means of probe-pointed scissors (Fig. 79). The bronchial glands must be dissected out and incised.

In cases of pulmonary tuberculosis where

an aneurysm has formed and ruptured, it is well to inject water into the pulmonary artery,



FIG. 77.—Lung, seat of extensive tuberculosis with cavitation in upper lobe. From a young male adult.

and then on section to notice from which branches of the bronchus it escapes. By this

means the ruptured sac may sometimes be readily localised.

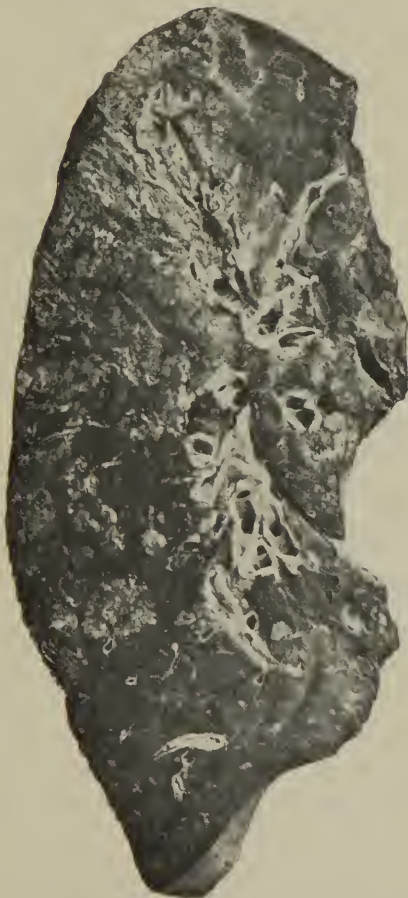


FIG. 78.—Section of tuberculous lung.

In cases of pulmonary thrombosis and embolism do not omit to slit up the pulmonary artery and its branches.

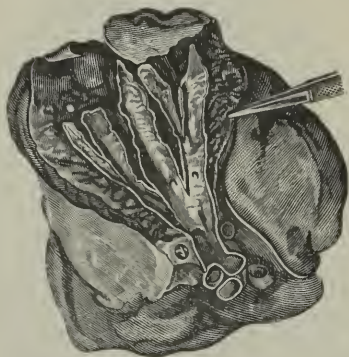


FIG. 79.—Bronchiectasis. (Sieveking.)

**Examination of Mediastinal Structures.**—This can be most satisfactorily accomplished when the thoracic viscera have been removed in one piece. If possible, it is best to remove tongue, pharynx, œsophagus, larynx, and trachea, in connection with the lungs and heart. Pass a long-bladed knife up into the floor of the mouth immediately behind the symphysis of the jaw, and cut through the lateral attachments. Draw down the tongue. Cut through the soft palate at its junction with the hard, and then through the fauces. Divide the posterior wall of the pharynx. Draw all the soft structure of the

neck forwards and downwards. Divide the subclavian vessels behind the sternal end of the clavicles. Pull the contents of thorax forwards, and cut through œsophagus, aorta, and inferior vena cava. If there is anything in the stomach, ligature before making section. In poisoning cases take the gullet with the stomach.

Azygos veins, thoracic duct, and sympathetic nerves may be dissected on the posterior wall of the thorax.

After removal from the body lay the thoracic contents on the dissecting table, with their posterior surfaces upwards. With a pair of "bowel scissors" slit up the pharynx and œsophagus in the posterior median line. Note the condition of the tonsils. Open up the larynx in the middle line posteriorly, and extend the incision along the trachea, pulling the œso-



FIG. 80.—Mass of meat blocking up entrance to larynx.  
From a subject "found dead."

phagus to one side. Do not omit to carefully examine the pharynx and larynx in medico-

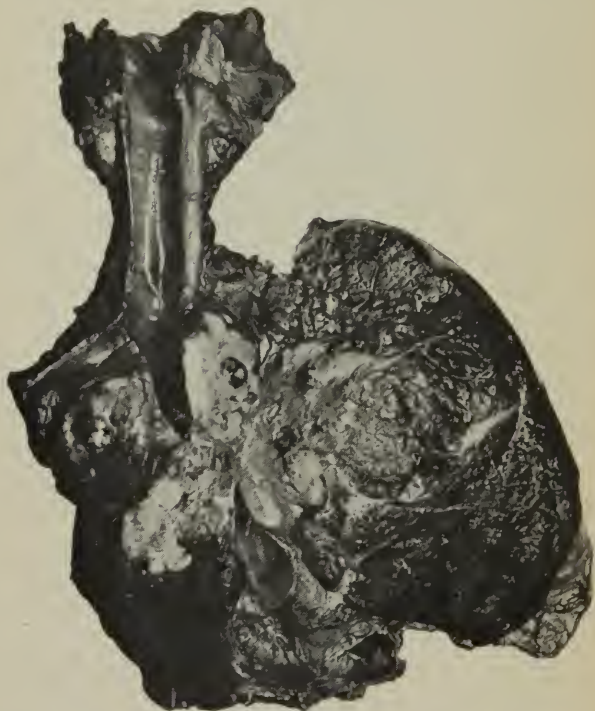


FIG. 81.—Malignant growth invading lung, compressing bronchus, and producing septic pneumonia.

legal cases for foreign bodies (Fig. 80). Make sections into the thyroid gland. Examine the

thymus when present. Open up the thoracic aorta and dissect out the nerves. Inspect the mediastinal glands.

In all cases of mediastinal growth and intra-thoracic aneurysm always remove the whole of the thoracic organs together, and dissect and study the relation of parts outside the chest (Fig. 81).

## CHAPTER VII

### EXAMINATION OF THE ABDOMEN

THE abdomen having been opened and thoroughly examined by inspection and palpation, the further investigation may be proceeded with.

**General Considerations.**—The order of the removal of the abdominal viscera varies with circumstances. When there are extensive adhesions, or in certain other lesions, it may be desirable to deviate from the the usual method. In private cases it is not always necessary to remove the intestines.

Remember to palpate for mobility of the kidneys before the colon is removed.

In cases of growth, extensive adhesions, and certain retro-peritoneal lesions it may be well to remove the abdominal viscera *en bloc*.

In such conditions as subphrenic abscess it is often desirable to remove the parts in connection with the thoracic organs (Fig. 82). It is well for the student to practise the different methods of procedure.

**Removal and Examination of the Intestines.**—Always carefully palpate the whole of the in-

testinal tract before proceeding to remove any part. In this way any abnormalities such as Meckel's diverticulum or limited lesions are at

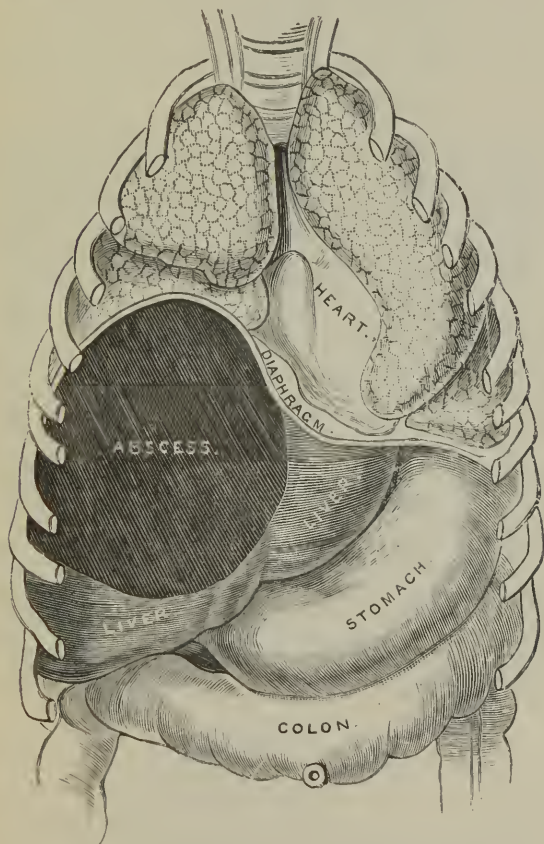


FIG. 82.—Subphrenic abscess. (After Leyden.)

once detected. Generally it is best to commence the detailed examination of the abdominal viscera by removing both the small and the large intestine. Place a double ligature at the upper part of the rectum and at the commencement of the jejunum, and remove the intervening portion. The



FIG. 83.—Method of opening intestines.

guts must be separated close to their mesenteric attachment. Scissors or the ordinary knife is best for detaching the large intestine. The small bowel can most readily be removed by



FIG. 84.—Large intestine laid open, from case of ulcerative colitis.

cutting the mesentery with a long thin-bladed knife, using the same with a sawing or fiddle-bow movement. After removal from the body the intestine is to be slit up with the bowel scissors (Fig. 83). The small gut must



FIG. 85.—Ulcerative colitis, with extensive fatty deposit in subserous coat of the colon.

be divided along the line of attachment of the mesentery. The vermiform appendix must also be opened up. After thorough cleansing examine for such lesions as enlargement of

lymphoid elements, ulceration, hæmorrhages, congestion, and growths (Figs. 84, 85, 86).



FIG. 86.—Dilated cæcum and colon laid open. Malignant stricture through which bougie is passed.

Do not confuse post-mortem lividities with true engorgement. Portions of the intestines are frequently found to be bile-stained.

“Agonic” intussusception is occasionally met with, especially in young subjects.

**EXAMINATION OF URINO-GENITAL ORGANS.**— Sometimes the removal of the kidneys and pelvic structures is left till almost the end of the examination of the abdomen. As a general rule it is best to proceed to their examination directly after the intestines have been taken out. Although the kidneys are often removed separately, this should never be done until the urinary passages are known to be normal. It is often wise to open the bladder and slit up the ureters and pelvis of each kidney while the parts are *in situ*.

Frequently the whole of the urinary tract must be removed in one piece, and, in many instances, in association with the adjacent genital and other pelvic structures. Free the kidneys from their connections. Take care not to injure the adrenals. These may sometimes conveniently be allowed to remain attached to the kidneys. Follow down the ureters. Let the kidneys and ureters hang over the groins while the pelvic structures are being separated.

**Examination of Male Genital Organs.**—In the male continue the median incision along dorsum of penis, and separate off the skin. Divide the penis transversely behind its glans. Be careful in removing membranous and prostatic portions of urethra. Cut through symphysis, and separate or saw out symphysis and piece of pubic bones (Fig. 87). Now dissect back

penis, cut through attachments of crura, and separate tissues beneath prostate. The parts may then be removed *en masse*, and the dissection and examination completed outside the body.

Some pathologists, instead of cutting through



FIG. 87.—Method of opening bladder and urethra in position. Symphysis and portion of pubic bones have been removed, and piece is shown placed on left thigh. From an elderly male with gangrenous cystitis. Director indicates the necrotic bladder.

the pubic arch, free the penis, and then making an opening beneath the symphysis, push it through into the pelvic cavity, where, after freeing prostate, &c., the parts can be removed together. In many cases it is well to remove the testicles in association with the above parts.

The *bladder* is usually best exposed by a median vertical incision (Fig. 88).



FIG. 88.—Illustrating method of exposing interior of bladder. Carcinomatous growth springing from vesical walls. (Norman Moore.)

The *vesiculæ seminales* not infrequently are neglected. In all cases of genito-urinary disease, and especially in tuberculosis, they should be carefully dissected.

They are best exposed by dissecting off the fascia at the base of the bladder immediately

above the prostate by means of a pair of scissors, and are most conveniently opened with a probe-pointed pair.

It may be desirable to retain samples of the contents in the form of "cover-glass preparations," particularly in tubercular and gonorrhœal cases.

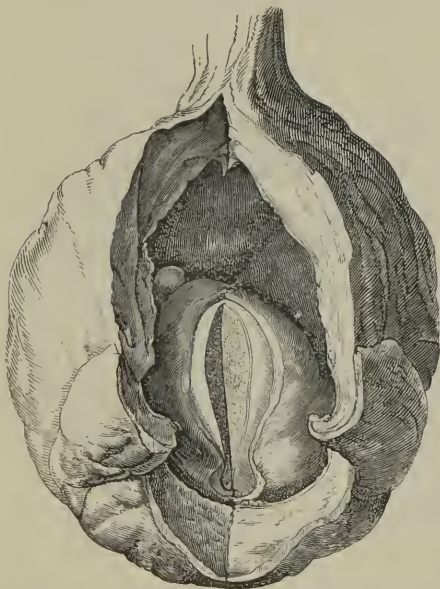


FIG. 89.—Hæmatocele; much induration of tunica vaginalis. (Carling.)

The *prostate* is best examined by means of a series of transverse sections.

The *testicles* should be examined before the pelvic contents are removed.

Inspect the situation of the internal abdominal rings. If a hernia is present the sac is to be removed with the cord and testicle in one piece. If no hernia exists trace back the vas deferens. Pull the testes up towards the abdomen. Incise the rings if necessary. Separate the tunica vaginalis from the scrotum, taking



FIG. 90.—Section of syphilitic testes, with gummata of various sizes. (Bowlby.)

care not to cut any invaginated skin. Open the sac anteriorly in the long axis of the testicle (Fig. 89).

The testis is best divided by a single incision passing through the globus major and gland down to its hilum (Fig. 90).

**Examination of Female Genital Organs.**—In the examination of female cases, especially where the condition of the genitals is of medico-legal importance, the investigation must be conducted with special care.

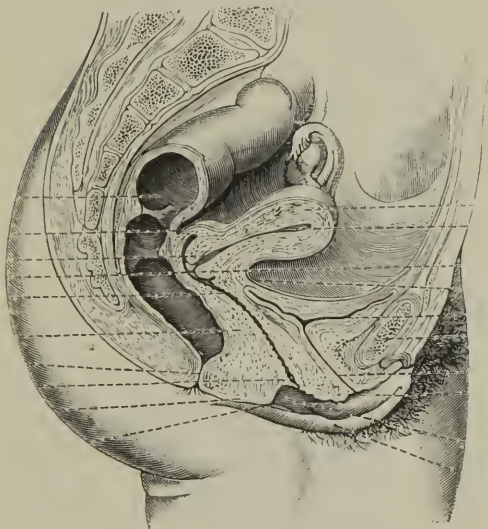


FIG. 91.—Vertical section of female pelvis. (Galabin.)

In many cases the internal genital organs in the female can be thoroughly examined without removal from the body. The ovaries should be sectioned and the uterus opened.

In all cases, however, it is more convenient and satisfactory to remove the whole of the

pelvic structures together, and dissect them outside the body.

Separate the bladder from the pubes. Incise

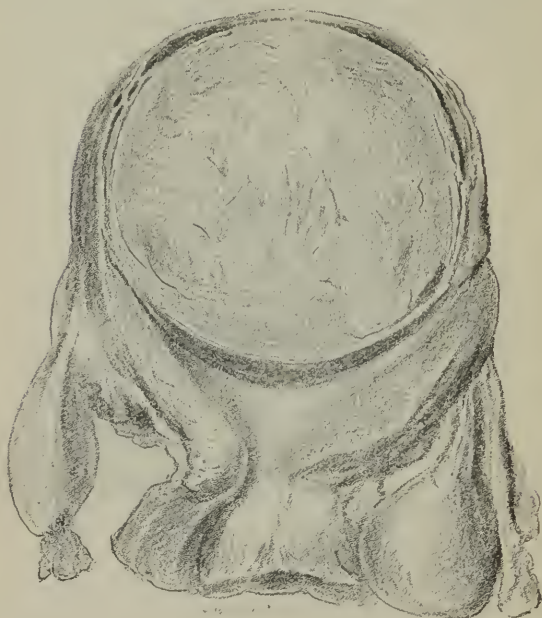


FIG. 92.—Fibro-myoma of uterus, illustrating method of section through greatest diameter of growth. (Norman Moore.)

the peritoneum round the brim of the pelvis. Bring the rectum forward. Now cut through the rectum, vagina, and urethra.

If it is necessary to remove the whole of the vagina and labia minora, insert the knife vertically immediately above the urethra. Cut through all the structures between the bladder and the pubes. Continue the incisions downwards external to the labia minora, and divide the rectum just above the anus. The perineum is not to be divided. Lift the pelvic contents up by the left hand, and with a few touches of the knife free them from their connections.

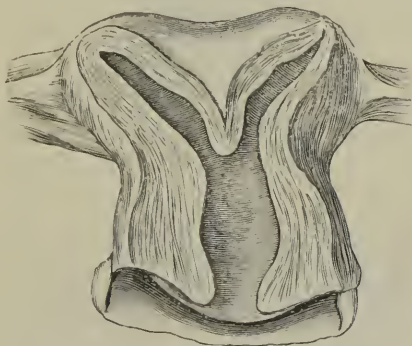


FIG. 93.—Uterus bicornis. (Galabin.)

Now proceed to expose the different parts. Slit up the rectum with the bowel scissors. Open up the urethra and bladder with probe-pointed scissors. Usually the bladder is opened by a vertical incision while the viscus is *in situ*.

Generally the vagina is divided in the anterior median line, but if desirable it may be slit up

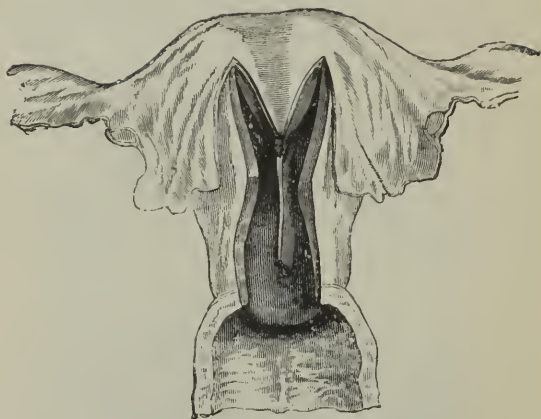


FIG. 94.—Uterus septus. (Galabin.)

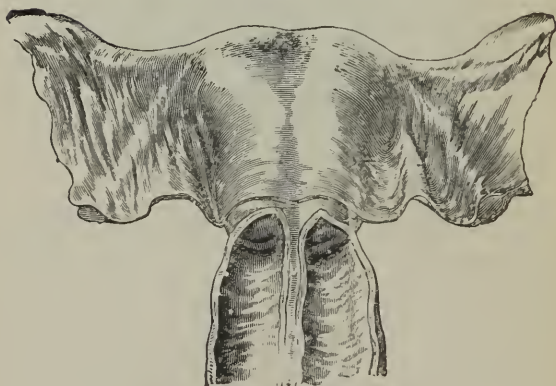


FIG. 95.—Double uterus and vagina. (Galabin.)

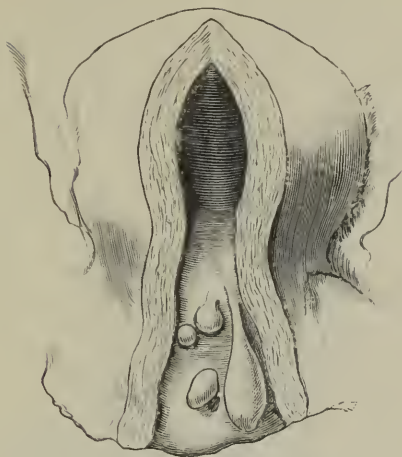


FIG. 96.—Uterus opened to show mucous polypi within cervical canal. (Galabin.)



FIG. 97.—Fibro-myoma projecting into cavity of uterus. (Sieveking.)

along its posterior wall or an incision can be made up each side into the lateral fornices.

Examine the os, and then divide cervix and body of uterus by means of a stout scalpel or strong-bladed scissors in the anterior median line (Figs. 91—97). Extend the upper end of the incision into the uterus and outwards to each Fallopian tube. In morbid conditions, when it is necessary to open the canal, fine directors and fine probe-pointed scissors will be found of service.

The broad ligaments and structures contained therein may need to be dissected.

The ovaries are best divided by means of a knife, cutting towards the hilum of the gland. Specially examine for corpora lutea.

*Separate Removal of the Kidneys.*—Where there is no affection of the urinary passages or genital tract the kidneys can be removed separately.

Cut through the peritoneum by a vertical incision outside the ascending and descending colon, first testing for any degree of mobility. Free the organs from their surrounding fat and pull each forward. The left is usually removed first. Place the fingers astride the vessels at the root of each organ, and cut behind them, and when free pull the ureter forwards with the kidney and divide it low down. It is well always to cut the ureter considerably longer in one kidney than the other, so that the organ

may be recognised at a glance. Remove the perinephritic fat, and measure and weigh each organ.

*Opening the Kidney.*—The kidneys, however



FIG. 98.—Showing method of holding the kidney and dividing it along its convex border.

removed, are to be opened along the convex border by section with a large flat knife carried through so as to divide each organ down to its pelvis.

This is best accomplished by grasping the kidney in the left hand, with the convex border pointing towards the operator, and drawing the blade of the knife from heel to toe, through the organ (Fig. 98).

The pelvis and calices can be further explored by opening them up with scissors.

Examine the parts systematically in the following order:—Capsule, surface, consistency, colour, cortex, medulla, pyramids, calyces, pelvis, and vessels (Figs. 98—101).

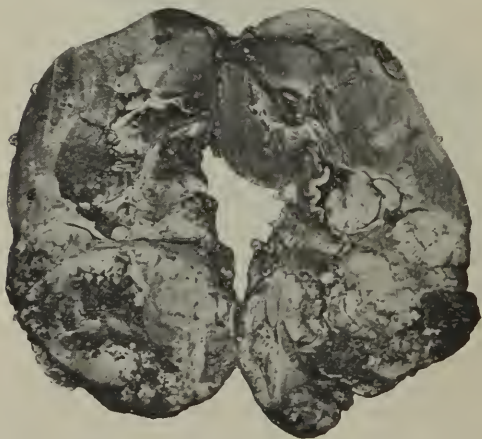


FIG. 99.—Divided kidney, seat of sarcomatous infiltration.

Particularly note the manner in which the capsule strips. In many cases of granular



FIG. 100.—Kidneys sectioned, and showing abscesses at upper end. From a man aged 37, the subject of pyæmia.



FIG. 101.—Divided kidney, showing cystic structure at upper end.

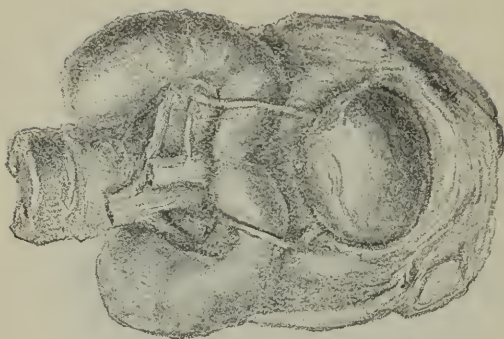


FIG. 102.—Mal-development of kidneys. "Horse-shoe" kidney (Norman Moore).

kidney and secondary inflammation of the organs it is more or less adherent to the surface.

Abnormalities of the kidneys are fairly common. The "horse-shoe" kidney is the usual form of "fusion" met with (Fig. 102).

**Examination of Stomach and Duodenum.**—These may be removed together, and often advantageously with the lower part of the œsophagus and pancreas attached. In cases of obstructive jaundice the common duct must be thoroughly investigated before the duodenum is removed, or the liver and gall-bladder must be removed in connection, and the parts dissected outside the body. As a routine method it is wise after opening the duodenum to squeeze the gall-bladder, and by forcing the bile through the papilla into the intestine demonstrate that no obstruction exists. Before removing any of these structures the foramen of Winslow and particularly the adjacent portal vein should be thoroughly examined.

In poisoning cases the contents of the stomach and intestines must always be saved. If unprepared to collect the gastric juices in a suitable vessel, the stomach must be used as a bottle for its own contents by ligaturing both ends. The stomach is usually opened along the greater curvature. Divide the duodenum with the bowel scissors, keeping along its convex border. Often the stomach and duodenum are opened *in situ*. Special attention must be given to the

biliary papilla and the condition of the bile and pancreatic ducts.

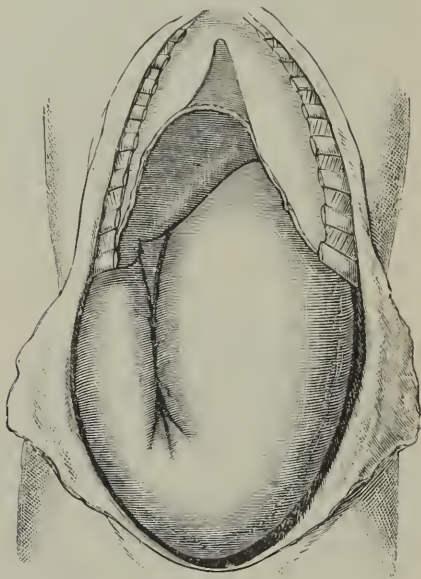


FIG. 103.—Dilated stomach almost filling abdominal cavity. (Hilton Fagge.)

**Examination of the Pancreas.**—The *pancreas* is generally most conveniently removed in connection with the stomach and duodenum.

It can usually be freed from surrounding structures by a few strokes of the knife. Beware of injuring the left adrenal.

Although the organ is sometimes dissected while in the body, it is generally best to leave sectioning it until after its removal.

It varies greatly in consistency, and is often much altered by post-mortem changes.

Careful examination of the head of the gland for growth or fibrosis should always be made.

The organ is best examined by making a series of thin transverse sections. The duct may be slit up with fine probe-pointed scissors. It is best found at the junction of the head with the body of the gland. It should be followed downwards into the papilla and outwards into the tail.

Sometimes calculi are present in the duct, or the canal may be dilated or present cystic formations.

When hæmorrhage is found, its exact situation and extent should be carefully noted.

In preserving portions for microscopic investigation osmic acid will frequently be found of service, especially in cases of so-called pancreatitis.

The splenic artery and vein should be laid open by means of fine pointed scissors.

**Examination of the Spleen.**—The *spleen* is often the first organ removed from the abdomen. It is convenient sometimes to remove it in connection with the pancreas. It is usually incised in its greatest diamenter (Figs. 104, 105). Sections carried transversely to its long axis are

convenient, but whichever way the organ may be divided the slices should remain attached by the capsule.

Frequently the spleen is so soft and friable as to need very careful handling to prevent tearing.



FIG. 104.—Spleen divided, showing secondary growth.

The capsule is in many cases wrinkled. When patches of lamellar fibrosis or depressions are met with in the capsule, it is well to cut into them. Scars are often the evidences of old infarction.

In cases of lardaceous disease, the iodine test must be applied to a washed section of the organ.



FIG. 105.—Spleen, sectioned and showing nodular masses of secondary sarcoma. Primary, round, and spindle-celled sarcoma in pelvic wall. Spleen weighed 21 oz., size  $7\frac{1}{2} \times 4\frac{1}{2}$  in. From a middle-aged male.

Not unfrequently accessory spleens, or splenules as they are usually termed, are met with

in the gastro-splenic omentum or in the great omentum.

In certain blood conditions and infective diseases it is well to prepare cover-glass preparations from the fresh splenic pulp.

**Examination of the Adrenals.**—The removal of the adrenals is generally left until the stomach, duodenum, and pancreas have been taken out. The left may readily be injured in removing the tail of the pancreas unless care is taken. The right should always be examined before the liver is separated.

Sometimes it is convenient to remove the adrenals in connection with the kidneys. They should always be sectioned transversely. In cases of Addison's disease the adrenals must be dissected out, together with the semilunar ganglia and solar plexus.

**Examination of Liver and Gall-bladder.**—These are often removed early in the examination. Sometimes this is convenient, as giving more room for dissection. Generally they should be left till almost the end. The organ can readily be freed from all its attachments and lifted out. It may be divided by long sections passing through its greatest diameter, although some prefer to make the cuts antero-posteriorly, parallel to the falciform ligament (Figs 106—110).



FIG. 106.—Vertical section through liver with numerous secondary deposits of melanotic sarcoma (Norman Moore).

Do not forget to submit portions of the fresh liver in cases of pernicious anæmia to a soaking in a 10 per cent. solution of potassium ferrocyanide, and then washing well in weak hydrochloric acid (2 per cent.), so as to develop the "prussian blue colour" indicative of the presence of iron.

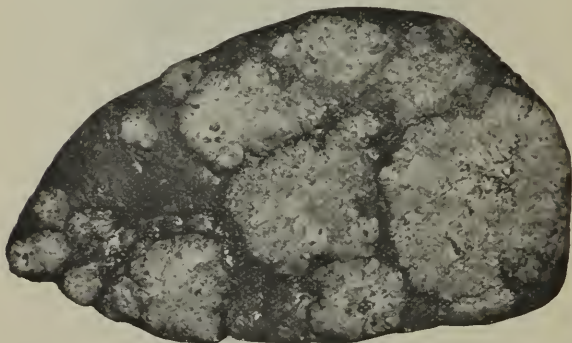


FIG. 107.—Antero-posterior section of liver, presenting numerous nodules of secondary carcinoma. Primary growth in rectum. From a middle-aged male.

In so-called "emphysema" of the liver, squeeze portions of the organ under water, when bubbles will escape.\*

The gall-bladder must be opened with scissors, and the cystic and bile ducts followed as far as possible (Fig. 112).

\* See 'Medical Chronicle,' June, 1896, p. 224.



FIG. 108.—Large cirrhotic liver photographed in position.



FIG. 109.—Cirrhotic liver, opened out by transverse incision.



FIG. 110.—Section of the liver showing biliary cirrhosis.

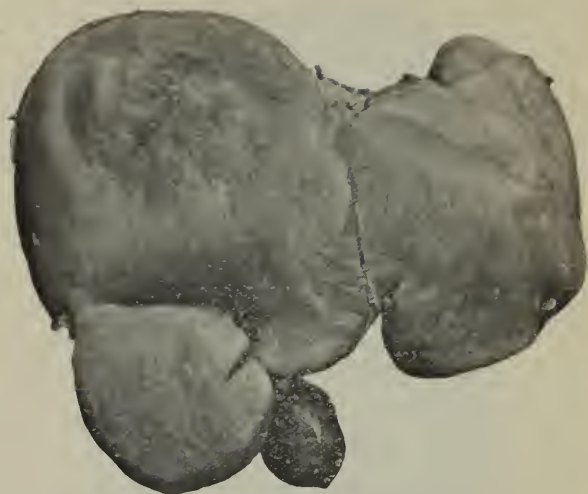


FIG. 111.—Lingual process of right lobe of liver and distended gall-bladder.



FIG. 112.—Gall-bladder laid open by longitudinal incision and showing aggregation of small gall-stones.

**Examination of Mesentery and Structures forming Posterior Wall of Abdomen.**—The viscera having now all been removed, the remaining structures are to be investigated.

The mesentery will already have been examined in part. The vessels and lymphatic glands may be still further explored.

Particular attention should be given to the retro-peritoneal glands.

Examine the thoracic duct and receptaculum chyli before removing the aorta. The solar plexus and sympathetic cords may also be dissected out.

Slit up the aorta with scissors, and carry cuts into the iliac arteries. Examine the vena cava and pelvic veins. It is often well to do this before removing the pelvic organs. Dissect off the aorta and inspect the bodies of the vertebræ. Cut into the psoas muscles. If necessary examine the sacro-iliac joints and bones forming the pelvis.

## CHAPTER VIII

### EXAMINATION OF THE HEAD AND SPINE

THE examination of these portions of the body is undertaken principally for the purpose of investigating lesions in connection with the brain and spinal cord, their membranes, and the organs of special sense.

**Superficial Examination.**—Before proceeding to any dissection, careful examination of the external characters must be made according to the manner already indicated.

Measurements should be taken where necessary. The graduated callipers are of particular service in taking the diameters of the head (Fig. 43). Casts of the head and face have sometimes to be prepared.

The eyes should always be inspected with particular care.

The various orifices—ears, nose, and mouth—should be inspected for morbid discharges, foreign bodies, or evidences of injury.

**Scalp Incision.**—The scalp is to be divided by an incision extending from one mastoid region

to the other across the vertex, the cut being carried through to the bone. This is best accomplished by means of a small, short, narrow-bladed scalpel, which, after the preliminary section into the scalp over the right mastoid has been made, is carried with its cutting edge directed outwards to the skin. The tissues are thus divided from within, and the hair parted rather than cut. Strip the anterior flap forwards to the superciliary ridges; the posterior backwards to below the occipital protuberance. If the hair be long, roll it up and protect beneath the scalp flaps. A towel may be fixed tightly round the head and neck over the reflected parts.

If examination of the parotid gland is subsequently required, the coronal incision may be readily extended.

**Opening the Skull.**—Before proceeding to saw through the skull turn down the temporal muscles and thoroughly detach the pericranium. Unless this be done the teeth of the saw will readily become clogged, and sawing rendered very difficult. Two chief methods are employed in opening the skull:

1. In the *circular* method the skull is sawn through along a line corresponding anteriorly to the depression between the frontal eminences, posteriorly to the occipital protuberance, and laterally on a level with the helix of the ear when the latter is drawn upwards.

If two short shallow parallel saw cuts are made transversely at the vertex, strong twine can be caught in them after being passed through the temporal muscles, and thus the skull-cap can be easily retained in position (Fig. 113).

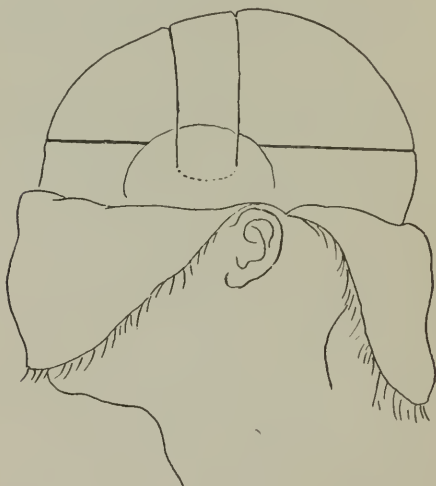


FIG. 113.—Method of fixing skull-cap when the skull has been opened by a circular saw cut.

In opening the skull by the circular method a crown or coronet is undoubtedly a useful guide, but the student should learn to make a clean saw cut without any such assistance (Fig. 41).

The most convenient form of saw for general use is indicated in Fig. 18.

2. The *wedge-shaped* incision is convenient in facilitating the restitution of the head. The anterior saw cut passes through the frontal eminences to a point just above and behind the external auditory meatus. The posterior passes near the apex of the lambda, or about three inches above the external occipital protuberance. The two incisions join at an obtuse angle. In assisting to fix the skull it has been suggested that one of the saw cuts should be so extended as to allow of the insertion of a thin bandage, which, after replacement of the calvarium, may be pinned over the vertex (Fig. 114). The bones are sometimes drilled and wired.

The skull must be sawn through carefully so that the dura is not injured. Sometimes the mallet and chisel may be employed to break through the inner table, but never in a medico-legal case.

In some cases of posterior meningitis and hydrocephalus (Fig. 115), it may be advisable to remove the greater part of the occipital bone by a V-shaped incision, the apex being at the foramen magnum.

In infants the cranium can be conveniently laid open by dividing it along the lines of suture with a pair of strong scissors and bending the parts outwards.

The blunt hook, which in many instances is

supplied fixed at the handle-end of the hammer, often proves of great service in wrenching off the skull-cap.

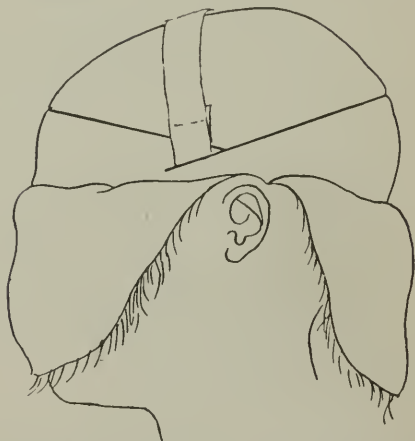


FIG. 114.—Method of fixing the skull-cap after opening the cranial cavity by a wedge-shaped incision.

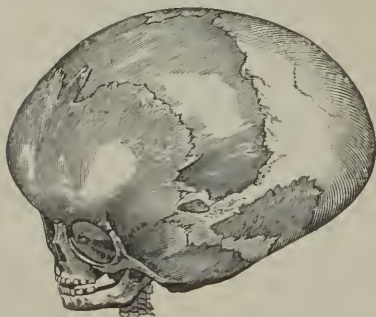


FIG. 115.—Hydrocephalic skull (Sieveking).

The T-chisel is the best form for applying leverage after the skull cap has been sawn through all round (Fig. 26).

**Examination of the Dura Mater.**—Not infrequently the dura is adherent to the skull. This is normal in children. When firmly fixed to the bone it is best removed with it. The

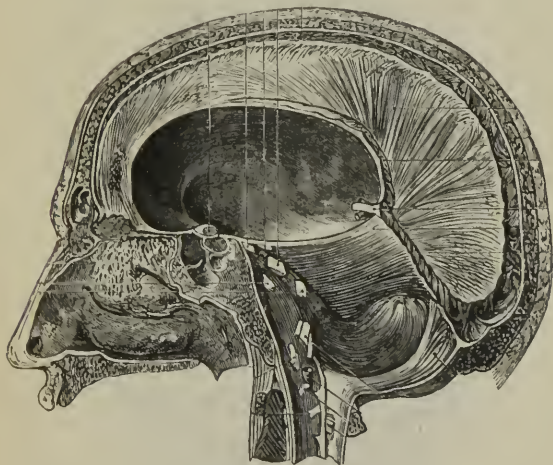


FIG. 116.—Sinuses of the skull (from Hirschfeld and Leveillé).

division is most conveniently accomplished by means of a probe-pointed curved bistoury (Fig. 10), or probe-pointed scissors (Fig. 17).

After opening the superior longitudinal sinus incise the dura along lines corresponding to the saw cuts, separate the anterior attachment of

the falk cerebri and turn the dura backwards. The other sinuses and parts at the base of the skull must be dissected after the removal of the brain (Figs. 116, 117).

**Removal of the Brain.**—Lift up the frontal lobes with the left hand. Divide all the nerves

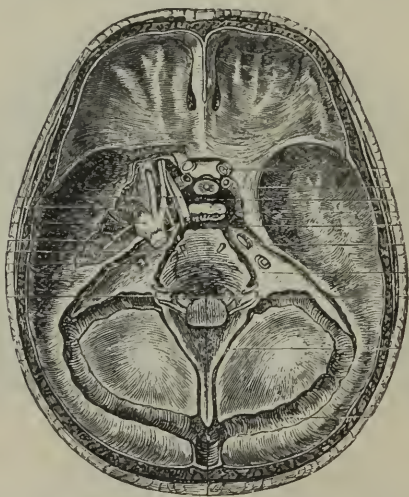


FIG. 117.—Dissection of the sinuses of the skull and cranial nerves. The cavernous sinus dissected on the left side (Gray).

and vessels at the base close to the bone. Cut along the attachment of the tentorium cerebelli on either side. Divide the vertebral arteries and spinal cord as low down as possible.

A special knife, termed the myelotome, is sometimes used for this purpose.

**Examination of the Brain.**—Place the brain with its base upwards and carefully investigate all the structures, especially following the middle cerebral arteries along the Sylvian fis-

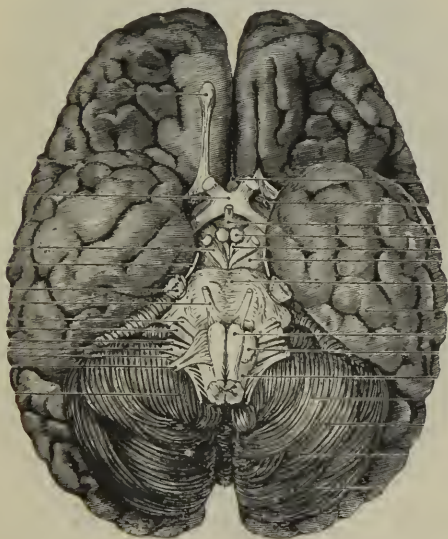


FIG. 118.—The base of the brain (from Hirschfeld and Leveillé).

tures (Fig. 118). Note particularly any lesions in connection with the pia and arachnoid or alterations in the convolutions (Figs. 119, 120).

When blood is found about the base of the

brain it should be gently washed away by a fine spray of water. After this a ruptured

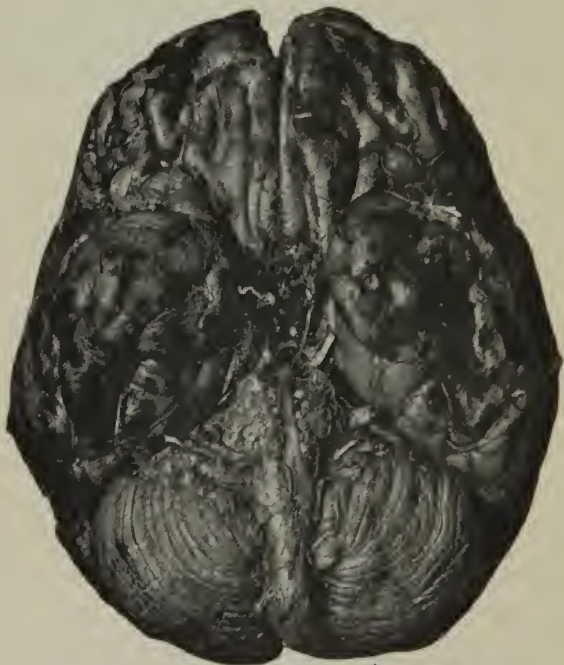


FIG. 119.—Brain, under surface. Numerous secondary deposits of melanotic sarcoma. Primary growth in skin of chest wall. From a man aged 40.

aneurysm in connection with one of the cerebral arteries may often be detected with the greatest ease.

The pituitary body should, whenever possible, be removed with the brain. In cases of acromegaly, particular care must be taken in removing it. If left in the pituitary fossa it



FIG. 120.—Subarachnoid effusion on the upper surface of the anterior lobe (Sieveking).

should be dissected out when the structures at the base of the skull are examined.

The surface of the whole brain must be examined in detail before any incisions are made. Notice the extent, depth, and arrangement of the convolutions.

See if the membranes are readily attached.

Do not confound Pacchionian bodies with tubercles.

In most cases it will be found best to harden

the brain before dissecting it. In medico-legal cases it is, of course, necessary to section it at once. When time will allow it should, however, always be hardened first. After removing any small portions of the cortex necessary for special microscopic examination, the organ can be suspended in gauze in formalin solution of suitable strength.

In this way the brain can be hardened in a very short time, and a much more satisfactory examination made than if the organ be dissected when fresh.

The *interior of the brain* may be investigated in several ways. In determining which procedure to adopt remember Virchow's postulate—"the individual peculiarities of the case must determine the method of examination." The plan followed should be the best suited for revealing the seat and extent of the lesion. The incisions should be so placed as not to interfere with the carrying out of an extensive microscopical investigation of the various portions of the brain if subsequently found necessary. In some conditions it may be well to arrange so that sections may be available as permanent museum preparations.

1. *Virchow's Method* is perhaps the most generally useful. It has been described as a "fore-and-aft" section method. It may be variously modified according to the necessities of any individual case. Separate the hemi-

spheres, slightly exposing the corpus callosum. Open into each lateral ventricle. Join the anterior and posterior cornua by a crescentic incision outside the basal ganglia, carried outwards to the cortex and allowing the membranes to act as a hinge or binding. Cut through the foramen of Monro and turn back the remains of the corpus callosum, fornix, and velum interpositum. Further incisions may be made into the cortex as required. Next divide the basal ganglia by a series of thin vertical sections. Then cut through the superior vermiform process of the cerebellum, exposing the fourth ventricle. Make radiating cuts into the lateral lobes of the cerebellum. Now fold the brain up and turn it over, and make a series of thin sections through the crura, pons, and medulla. In some cases the crura cerebri may be cut through at an early stage in the examination, and the cerebellum with the corpora quadrigemina, pons, and medulla removed and examined separately.

2. In *Pitres' Method* six sections are made parallel to the fissure of Rolando.

Various modifications of the perpendicular section method have been suggested. Nothnagel separates the hemispheres and divides them by partial incisions.

Hamilton\* gives figures of vertical sections according to the plan he advises.

Meynert has suggested a division whereby

\* 'Text-book of Pathology,' vol. i, 1889, pp. 23—28.

the different parts of the brain may be separated and their weight taken.

Weigert recommends a combination of the methods of Virchow and Meynert.

In an old method, still sometimes useful,

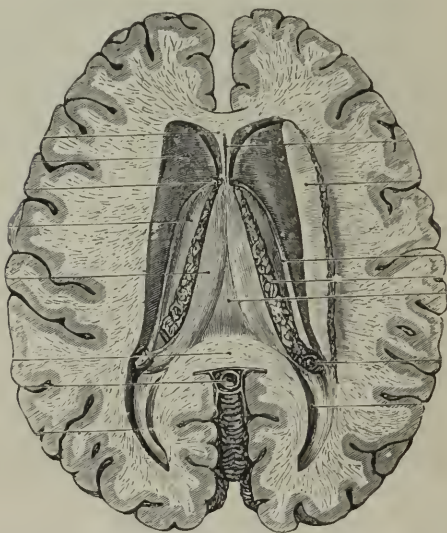


FIG. 121.—Lateral ventricles of brain as exposed by horizontal section (from Hirschfeld and Leveillé).

horizontal sections were made into the brain as it lay exposed in the skull after removal of the calvarium (Fig. 121).

**Removal of the Spinal Cord.**—This may be accomplished in two ways:

1. *Posterior Method*.—An incision is carried along the spinous processes from occiput to sacrum. Expose the lamina and open into the spinal canal by means of Luer's rachiotome (Fig. 22) or the ordinary saw with rounded



FIG. 122.—Illustrating method of using vertebral chisel and mallet in removing spinal cord by the so-called Italian method. Also shows A-block over which the spine is stretched.

end (Fig. 18). Savage's vertebral forceps may be employed with advantage. Cut across the dura at the lower end of the exposed spinal canal, and holding the membrane by means of dissecting forceps carefully cut through the nerve-

roots. After removing the cord incise the dura longitudinally and make a few transverse sections, supporting the cord on the fingers.

The spinal cord is then to be suspended in a cylindrical vessel containing Müller's fluid, formalin solution, or the special fixing and hardening agent it is desired to use.

Remember in removing the cord by this method it is best to take out the brain first.

2. The *Anterior Method* was introduced by Brunetti.\* The thoracic and abdominal viscera must first be removed. With the spine suitably stretched over a  $\Lambda$ -shaped block the pedicles of the vertebræ are divided by means of specially constructed chisels (Figs. 29 and 122). The bodies are then removed and the cord exposed and separated.†

**Examination of Special Organs.**—For the exami-

\* For detailed description of this method see article by Dr Harris, 'Brit. Med. Journ.,' 1888, vol. i, p. 738.

† For further particulars concerning the examination and preservation of the brain and spinal cord, I may refer students to the admirable and very practical little volume published by Dr Edwin Goodall ('Microscopical Examination of the Human Brain: a Manual of Methods,' 1894). For a thoroughly up-to-date handbook Pollack's work may be consulted ('Methods of Staining the Nervous System,' by Dr Bernhard Pollack, English translation from the second German edition by Dr W. R. Jack, 1899). Much assistance in technical details will be afforded by von Kahlden's well-known work ('Methods of Pathological Histology,' by C. von Kahlden, English translation by Dr H. Morley Fletcher, 1894).

nation of the nasal fossæ, eye, and ear, special dissections are, of course, necessary.

Harke has introduced a convenient method by which the skull may be divided into halves by means of a longitudinal incision.\*

The chief features of the nasal cavities may be exposed by removing the cribriform plate with a chisel and small saw. The meatuses of the nose may also be inspected by cutting through the hard palate by means of bone forceps.

The antrum of Highmore may be opened by making an aperture in the canine fossæ after everting the lip and incising the mucous membrane.

The roof of the orbits is best cut through by means of the chisel. The eye is to be divided in the transverse meridian. The anterior part should be left *in situ*, but the posterior half may be examined carefully in water.

The middle ear may be easily opened by chiselling away the thin roof of the tympanum. It is usually better, however, to remove the temporal bone as a whole, and make sections by means of a fine saw. The most convenient line of division is one starting at the styloid process and extending to the carotid canal, and running

\* A good description is given by Mallory and Wright, in their recent work on 'Pathological Technique,' 1898, p. 64.

parallel to the crest of the pyramidal portion of the petrous part of the temporal.

The frontal sutures may be readily exposed by chipping away the inner table of the frontal bone with bone forceps.

## CHAPTER IX

### SPECIAL EXAMINATIONS

#### **Examination of the Organs of Locomotion.—**

Usually it is only possible to subject the bones, joints, and muscles to a partial examination.

It is manifestly undesirable to open every joint of the body, but only too often an examination of all the joints is neglected.

*Examination of the Bones.*—It is sometimes absolutely necessary, however, to inspect these parts in cases of injury or suspected disease. The condition of the *bones*, and particularly the state of the epiphyses, becomes of importance in ascertaining the age. In blood diseases, like pernicious anæmia and leucocythæmia, portions of the long bones, as well as the medulla of the ribs and sternum, should be examined. Inflammatory processes and new growths particularly call for investigation. In fractures careful dissection may be necessary to expose the injured parts.

The medulla of the sternum can readily be exposed by making a vertical saw cut partially

through the sternum and then forcibly bending the bone. Cover-glass preparations of the pulp should be taken from different bones in all blood diseases.

The condition of the periosteum should always be carefully investigated.

Long bones are best divided by a longitudinal saw cut (Fig. 123). A saw with a moveable



FIG. 123.—Section of a rachitic femur (Sieveking).

back is not infrequently needed. A chain saw is also sometimes of service.

When the bones are fractured, a careful dissection may be necessary to thoroughly expose the whole extent of the injury.

*Examination of Joints.*—The *joints* may have to be opened in gout, osteo-arthritis, and rheumatism, and also in certain local affections, especially those of an inflammatory nature. The examination must be so conducted as to produce little or no disfigurement.

In some cases where it is necessary to subject a joint to special examination, it should be excised and the bones sectioned longitudinally by a coronal or sagittal saw cut.

*Examination of Muscles.*—The *muscles* should be thoroughly investigated in conditions of malnutrition. In trichinosis careful exploration may be necessary to detect the parasites.

**Examinations in Private Houses.** — A post-mortem may have to be conducted under considerable difficulties in a private house ; this is often undertaken for scientific purposes, and may then be of a limited character. When an examination is made for medico-legal ends it must be thorough and absolutely complete, whatever difficulties may be met with. Usually I prefer to make the examination with as little disturbance of the body as possible. It should be drawn to one side of the bed. Newspapers are extremely convenient, and very effective when suitably arranged around the body, in preventing any soiling of the bed linen. The papers may subsequently be readily disposed of by burning. An assistant is of much service.

In medico-legal investigations for the coroner, which, according to the present unsatisfactory custom, have often to be conducted in cottages or other unsuitable places, an intelligent constable may often be found willing and able to afford the pathologist considerable assistance. Sometimes the viscera may be opened and thoroughly investigated without removing them individually. Such organs as the lungs, kidneys, spleen, liver, and intestines can be incised in the body. Never allow any carbolic powder or such-like deodorising agent to be added to the body during the performance of the autopsy. See that all sponges and material likely to convey infection are destroyed. The disagreeable odour remaining in a room after an examination may be covered by burning coffee on an iron shovel.

It is convenient to keep a list of instruments and material needed in the examination of private cases ready at hand, so that if necessary they may be collected by an attendant at a moment's notice.

A trocar and cannula or a long india-rubber tube is of much service in cases of ascites.

**Special Examination in Female Cases.**—In cases of criminal abortion, rape, or suspected pregnancy, it may be necessary to particularly investigate the internal and external genital organs. Examine the labia majora for evi-

dences of injury or disease. Note presence or absence and character of hymen.\*

Collect any discharge for microscopical and bacteriological examination.

Examine for usual signs of pregnancy or recent delivery (Fig. 124).

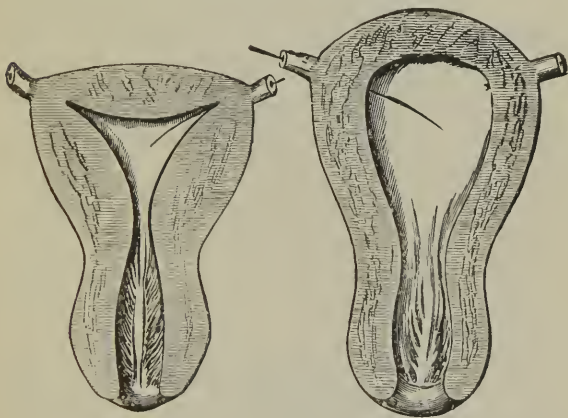


FIG. 124.—Sections of nulliparous and parous uterus (Galabin).

Always thoroughly examine the contents of the pelvis *in situ* before proceeding to make any incision. Search for evidences of old or recent inflammation or hæmorrhage. The cervix

\* Illustrations given in the recently published 'Atlas of Legal Medicine,' by Dr E. von Hoffmann, English edition edited by F. Peterson and A. O. J. Kelly, 1898.

and upper part of the vagina must especially be examined for punctured wounds, but the whole of the genital tract is to be dissected and minutely inspected.

The *breasts* should be explored by means of one or more incisions made from the pectoral surface, and carried so as not to penetrate the skin. In some cases it may be well to collect in a pipette a little of the milk or other fluid found in the glands for subsequent examination.

In the naked-eye examination of the breast according to Stiles' method,\* slices of the affected organ are placed in a 5 per cent. watery solution of nitric acid, then washed in water. The connective tissue assumes a gelatinous appearance, while the epithelial elements become differentiated as opaque white bands and areas.

**Special Forms of Death.**—It is unnecessary here to dwell on the investigation of the different causes or the varying mechanism of death. Those forms of death of medico-legal importance are fully dealt with in the ordinary textbooks of forensic medicine. Cases of "sudden death" should always be completely examined. The cause is often unexpected, and not infrequently such as might easily be overlooked unless an entire examination be made. I have elsewhere referred to a number of such medico-

\* Stiles, 'Edin. Med. Journ.,' June and July, 1892.



FIG. 125.—Homicidal cut-throat (Ogston).



FIG. 126.—Suicidal cut-throat (Ogston).

legal cases which I have recently investigated.\*

In connection with exceptional forms of death, reference should be made to Brouardel's fascinating lectures.†

Where possible, photographs should be taken of medico-legal cases.

Remember in cases of all wounds the dissection incisions should as far as possible avoid the affected regions until they have been fully described and drawn or photographed (Figs. 125, 126).

**Examination of New-born Infants and Children.**—A knowledge of the special anatomical features of the child is a necessary foundation.‡

In a medico-legal case let the examination be thorough and complete. Be prepared to answer such questions as—What is the degree of maturity of the child? Was it born alive? If

\* "On the Examination of Cases found Dead," 'The Scalpel,' January, 1898; "A Note on Rupture of Intra-thoracic Aortic Aneurysms, based upon an Analysis of Thirty-two Cases," 'Lancet,' 1897, July 24th; "Sudden Death in Aortic Stenosis," 'Medical Press and Circular,' May 11th, 1898; "Death from Impaction of Meat in the Pharynx," 'The Medical Press,' September 7th, 1898.

† Brouardel, 'Death and Sudden Death,' English edition, 1897.

‡ See admirable illustrations of frozen sections in 'The Topographical Anatomy of the Child,' by Johnson Symington, M.D., 1887.

so, how long did it live? How long had it been dead at the time of inspection? What was the cause and nature of the death?

Specially observe such points as—state of the umbilical cord, presence of vernix caseosa, condition of fontanelles, state of nutrition, or signs of injury. Give particular attention to the vessels from the umbilicus.

In the internal examination special attention must be devoted to the lungs, with the object of ascertaining if the child has breathed.

Note the size and form of the thymus. The question of enlargement of the thymus gland as a cause of sudden death in children has recently received full consideration by Rolleston.\*

Inspect the stomach for the presence of milk. Particularly investigate all parts liable to mal-development. Remember the possibility of death from starvation or exposure.†

Do not be misled by peculiarities in the

\* Rolleston, 'The Diseases and Primary Tumours of the Thymus Gland,' 1898, p. 8.

† Tables of weights and measurements of mature new-born infants are given in Casper's 'Handbook of the Practice of Forensic Medicine,' English translation by G. W. Balfour, M.D., vol. iii, pp. 19, 44, 58, 1864.

Woodman and Tidy, 'Forensic Medicine and Toxicology,' also give tables for reference of standard weights of children at different ages. These are of much practical importance in connection with such prosecutions as are instituted by the National Society for the Prevention of Cruelty to Children.

anatomy of the child; remember the changes which occur between birth and the period of full development. In considering the different stages of intra-uterine life it may be well to refresh the memory by a reference to works on human embryology. The dates of appearance of the points of ossification and the times of union of the different parts are of considerable importance in estimating age.

## CHAPTER X

### MEDICO-LEGAL CONSIDERATIONS

A VERY considerable number of pathological examinations are undertaken primarily for medico-legal purposes. In this chapter I wish to refer, very briefly, and necessarily in a somewhat fragmentary fashion, to some few points of practical importance in the investigation of these cases.

**Exhumation.**—A body can only be disinterred by authority of the Home Secretary. Any medical man may be called upon to undertake the examination, although usually an expert is selected. He should see that all necessary arrangements are made whereby the investigation may be rendered thorough and expeditious. A relay of grave-diggers may be needed. Someone capable of identifying the body must be present. It is well to be equipped with appliances for photographing.

The examination should be undertaken early in the morning with a good light, and in summer before the heat of the sun is experienced. A

table or board and trestles should be ready on which the body can be placed. As it is generally for suspected poisoning that exhumation is performed, well-stoppered bottles of varying sizes should be provided for preserving those tissues which it may be found necessary to retain for analysis. Portions of bone and samples of the soil should sometimes be preserved.

It used to be customary to use chloride of lime during the course of the examination, but it will be sufficiently evident that no deodorant or disinfectant should be employed until the investigation is completed. The pathologist may judiciously arrange so that he can stand on the windward side of the body.

If only the skeleton remains it may be necessary to pass the soil through a coarse sieve in collecting the small bones of the carpus and tarsus. Note the depth of the grave and the direction, situation, and any special features of the skeleton. If remains of any foreign material, such as rope, bullets, and the like be found, they should be carefully preserved.

The fauna of dead bodies has recently received attention.

**Mutilated remains.**—Occasionally the pathologist is called upon to examine portions of the body with a view to determine personal identity.

“Parts” from a dissecting room have sometimes been submitted for medico-legal report.

Many ingenious and elaborate methods have been employed for the concealment of remains. The practice of the disposal of the *corpus delicti* by dismemberment has been termed “*Dépêchage*.”\*

**Examination of Poisoning Cases.**—In *poisoning* cases see that the contents of the stomach and the organs to be submitted to analysis are placed in perfectly clean vessels, sealed, and immediately forwarded by special police messenger to the analytical chemist. Preserve any vomited material in a separate bottle.

For further details, consult the ordinary manuals of forensic medicine, the special treatises on poisons, and Hoffmann’s ‘Atlas of Legal Medicine.’

**Certificates of Death.**—In all cases of death, except those submitted to an inquest, a medical man is compelled to give a certificate. The form should be carefully considered, and the “primary” and “secondary” causes denoted with scientific precision. Difficulty is often experienced in recording the “duration of the disease,” and as a matter of fact it is generally not indicated or very indefinitely stated. Do not be misled by the common impression that

\* Griffiths: ‘Mysteries of Police and Crime,’ 1898, vol. i, p. 459.

an inquest is unnecessary if death occurred at a date more than a year and a day after the receipt of the injury. All cases of death resulting from the effects of any injury must be reported to the coroner. No post-mortem examination may be made on a coroner's case without his "order" or until after he has granted the certificate.

Mr. Braxton Hicks' admirable little brochure should be consulted by all recently qualified men.\*

When a post-mortem examination has been made on an ordinary case it is well in filling up the certificate to state definitely that such has been performed.

It may here be well to draw attention to the directions and suggestions published by the Registrar-General for the guidance of medical practitioners, together with the form of medical certificate used in this country.

#### MEDICAL CERTIFICATE OF THE CAUSE OF DEATH.

By section 20 of the Births and Deaths Registration Act, 1874 (37 & 38 Viet., c. 88), it is enacted that:—

"In case of the death of any person who has been attended during his last illness by a registered medical practitioner, that practitioner shall sign and give to some

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\* 'Hints to Medical Practitioners concerning the Granting of Certificates of Death,' by A. Braxton Hicks, 2nd edit., 1895.

person required by this Act to give information concerning the death a certificate stating to the best of his knowledge and belief the cause of death, and such person shall upon giving information concerning the death, or giving notice of the death, deliver that certificate to the Registrar, and the cause of death as stated in that certificate shall be entered in the register, together with the name of the certifying medical practitioner ;”

“ Where an inquest is held on the body of any deceased person a medical certificate of the cause of death need not be given to the Registrar, but the certificate of the finding of the jury, furnished by the coroner, shall be sufficient ;”

“ If any person to whom a medical certificate is given by a registered medical practitioner in pursuance of this section fails to deliver that certificate to the Registrar, he shall be liable to a penalty not exceeding forty shillings.”

And under section 39 of the same Act, *every person who refuses or fails without reasonable excuse to give or send any certificate in accordance with the provisions of the Act is liable to a penalty not exceeding forty shillings.*

It will be observed that in every case in which a registered medical practitioner has been in attendance *during the last illness* of the deceased, such practitioner is required to give a certificate of the cause of death. The certificate must be *under the hand* of such practitioner; and no other person is authorised by law to sign the certificate in his behalf.

It is requested that the persons to whom the medical certificates are given may be informed that they are to be delivered *TO THE REGISTRAR* when the death is registered, *AND TO NO OTHER PERSON*. These certificates, which are copied *verbatim* into the death register, together with the name of the certifying practitioner, are used for no other purpose, and are preserved as official documents by the local Registrars.

In order that the causes of death as certified by registered medical practitioners may be satisfactorily classified in the Statistical Department of the General Register Office, for publication in his weekly, quarterly, and annual reports, the Registrar-General requests :—

1. That registered medical practitioners in filling up their certificates will adopt as far as possible the suggestions printed on the following page; and

2. That the names of diseases in the certificates be WRITTEN AS LEGIBLY AS POSSIBLE in order that the Registrars may be enabled to copy them accurately into the death register.

#### SUGGESTIONS TO MEDICAL PRACTITIONERS RESPECTING CERTIFICATES OF THE CAUSE OF DEATH.

1. State the *causes of death* in terms as precise and brief as possible, and use the names adopted in the nomenclature of the Royal College of Physicians, taking the English names in preference to the Latin or other foreign equivalents. Vague terms, such as *decline*, *tabes*, *cachexia*, &c., should be *avoided*. So also *hæmorrhage* should not be assigned as a cause of death without further specification of its *probable origin* and the *organ affected*. *Tetanus* again should be defined as *idiopathic* or *traumatic*, and if the latter the *cause and nature of the injury* should be added.

2. Write the causes of death, when there are more than one, under each other, *in the order of their appearance*, and not in the presumed order of their importance.

3. Medical practitioners should not content themselves with assigning, as is too often done, some *prominent symptom* as the cause of death; but should state, whenever possible, *the disease to which the symptom was due*. Sometimes, doubtless, it will happen that the nature of the fatal disease cannot be ascertained with certainty; in such cases, and in such alone, a leading symptom should be assigned as the cause of death. “Dropsy” should not be returned as the cause of

death without stating *whether the dropsy was due to heart disease, or renal disease, or the like*; when "dropsy" alone is returned, it is assumed that the cause of this symptom was not ascertained.

Similarly, when the immediate cause of death was dependent upon some general condition, such, for instance, as the strumous, the syphilitic, or the rickety constitution, *this remoter cause should be stated, as well as the more immediate cause.*

4. In certifying deaths from any form of continued fever, *state the kind of fever*, and, in so doing, be especially careful to adopt the nomenclature of the College of Physicians. Avoid all such ambiguous terms as low fever, miliary fever, brain fever, hectic fever, febrile attack, &c. Similarly avoid the term "*typhoid pneumonia*," which may mean either asthenic pneumonia with typhoid symptoms, or enteric fever with secondary pneumonia.

Do not use the term infantile remittent fever for enteric fever in children.

5. When the cause of death has been verified by a *post-mortem* examination, the letters P.M. should be added.

6. State in fatal cases of smallpox whether vaccination had been performed with effect and when, or whether the deceased was unvaccinated. If possible state the evidence of vaccination, *e.g.* "two bad marks." The term "vaccinated" should be used in preference to "after vaccination." "Smallpox after vaccination, twenty-one days," is ambiguous, because the question arises whether the period (twenty-one days) refers to smallpox or to the vaccination; the cause of death should be certified as "smallpox twenty-one days (vaccinated)."

7. Whenever *child-birth* has occurred *within one month before death*, this fact should invariably be certified, even though it may be believed that the child-birth had no connection with the cause of death.

8. The *duration* of primary and secondary diseases in these certificates will always be considered to mean the time intervening between the first appearance of well-marked characteristic symptoms and death.

Smallpox, scarlet fever, measles, and other similar febrile diseases should, however, be dated *from the rigors and first symptoms*; not from the later appearance of the eruption.

Ague, epilepsy, angina pectoris, and other maladies that occur in fits or paroxysms, should be dated *from the first attack*, the duration of the last fit being added.

The duration should be stated in minutes or hours when the disease is fatal in less than forty-eight hours; in days when the disease is of less than fifty days' duration; in months or years when the disease is of still longer duration.

*Examples:—*(a) Scarlet fever . . . 30 days.

Anasarca . . . 7 „

Implies that the earliest symptoms of scarlet fever occurred thirty days before death, and that anasarca was first noticed seven days before death.

(b) Epilepsy . . . 5 years.

Last fit . . . 6 hours,

Implies that the first epileptic fit occurred five years back, and that the fatal fit lasted six hours.

(c) Excessive use of spirits —

Delirium tremens . . 6 days,

Implies that the deceased had been for an unknown time given to intemperance, and suffered from delirium tremens for six days before death.

9. SURGEONS in all cases of operation should return (a) the primary disease or injury; (b) the kind of operation; (c) the secondary diseases, such as erysipelas, purulent deposits, &c., and should state also the time from commencement of the primary disease, the time from the operation, and the time from the appearance of secondary disease, *reckoning in each instance to the death*.

*Examples:—*

Femoral hernia . . . 3 years.

Strangulated . . . 5 days.

Operation . . . 2 „

Peritonitis . . . 45 hours.

10. In every case of death from violence or suspected

violence the medical practitioner should advise the friends of the deceased to bring the case to the knowledge of the Coroner in order that he may decide as to holding or not holding an inquest, inasmuch as the Coroner may otherwise feel it his duty, when the case comes to his knowledge, to order the body to be exhumed and inquiry instituted.

N.B.—No medical practitioner is justified in giving a certificate unless he was personally in attendance upon the deceased during the last illness.

Not to be used by any other than a Registered Medical Practitioner.  
BIRTHS AND DEATHS REGISTRATION ACT, 1874.

**MEDICAL CERTIFICATE of the CAUSE of DEATH.**

To be given by the Medical Attendant to the Person whose duty it is to give it, with information of the Death, to the Registrar of the SUB-DISTRICT in which the DEATH took place, and TO NO OTHER PERSON.

I HEREBY CERTIFY that I attended  
during the last illness; that such Person's age was stated to be  
the day of 18; that he Died\*  
the day of 18, at  
and that to the best of my knowledge and belief the Cause of h death was as hereunder written.

\* Should the Medical Attendant not feel justified in taking upon himself the responsibility of certifying the fact of Death, he may here insert the words "as I am informed."  
† The duration of each form of Disease or Symptom is reckoned from its commencement until death occurs.

Cause of Death.	Duration of Disease in		
	Years.	Calendar Months.	Days. Hours.†
Primary			
Secondary			
.....			

Witness my hand, this day of 18.  
Signature  
Qualification as registered by Medical Council  
Residence

N.B.—THIS CERTIFICATE IS INTENDED SOLELY FOR THE USE OF THE REGISTRAR, to whom it should be delivered by the Person giving information to him of the particulars required by law to be registered concerning the Death.  
Penalty of £2 for neglect of Informant to deliver this Certificate to Registrar.  
\*\* The Registrar-General cautions all persons against accepting or using this certificate for any purpose whatever except that of delivering it to the Registrar.

The following persons are alone qualified to be informants for the registration of the death, and to whom only the certificate should be given :

1. A relative of the deceased, *present at the death*.
2. A relative of the deceased, *in attendance* during the last illness.
3. A relative of the deceased dwelling or being in the sub-district in which the death occurred.
4. A person "present at the death."
5. The "occupier" of the house in which the death occurred.
6. An "inmate" of the house in which the death occurred.
7. The person "causing the body to be buried."

By the 10th Section of the Births and Deaths Registration Act, 1874, the nearest relatives of deceased persons are required to be the informants of deaths, and they incur a penalty of £2 if they fail to comply with this law. The Registrar-General does not rigidly insist that the nearest *relatives* shall in all cases attend before the Registrar; but unless strong reasons for their non-attendance can be given it is the Registrar's duty to require that if there are in the sub-district any *relatives* of the deceased, either dwelling or being there for the time, some one of such *relatives* shall fulfil the legal obligation to sign the register book as informant. If no *relative* is available, as above referred to, then the register book may be signed by a person having one of the other legal qualifications.

Informants must be prepared to state accurately to the Registrar the following particulars :

- (1) The *date* and *place* of death.
- (2) The *full names* and *surname* of deceased.
- (3) The correct *age* of deceased.
- (4) The *rank*, *profession*, or *occupation* of deceased. [If deceased is a *child* or an *unmarried person without occupation or property*, the full names and rank or profession of the *father* will be required (except in the case of *illegitimate children*); if a *wife* or *widow*, those of the *husband* or deceased *husband*.]

Useful information respecting the registration of births and deaths will be found in Mr. Glenn's admirable 'Abstract of the Principal Laws affecting the Medical Profession.'\*

**Relations to the Coroner's Court.**—Cases of violent or suspicious death have, in England, always to be submitted to the coroner. In Scotland the Procurator-Fiscal undertakes the duties of both coroner and jury.

Every practitioner who may be called upon to make an investigation for the coroner should be acquainted with the sections of the Coroners Act of 1877, pertaining to the conduct of post-mortem examinations and the giving of medical evidence. Any medical man may be called upon to conduct the investigation at the coroner's discretion, provided he is "a legally qualified medical practitioner in actual practice in or near the place where the death happened."

Never commence the examination without the formal "order" from the legally constituted authority. Occasionally the assistance and protection of the police may have to be sought in order to carry out the examination.

In important medico-legal cases two medical men should be present. If any person is likely to be incriminated he should have the opportunity of being medically represented at the autopsy.

\* 'The Medical Directory' for 1899. Published by Messrs J. and A. Churchill.

The pathologist must be prepared to give a definite opinion as to the connection between cause and effect, the morbid agent, and the ultimate consequences. Carefully distinguish between the effects of natural and adventitious causes. If possible, the autopsy should be conducted before putrefactive processes have commenced.

Occasionally it may be necessary to examine a party connected with the death in question.

If possible, ascertain the circumstances attending the death before commencing the examination of the body.

Clothes or foreign bodies found on the body should be retained in sealed vessels or so marked that they can be immediately identified in court.

The following is the kind of form of order adopted by most coroners :

CORONER'S INQUEST at \_\_\_\_\_ upon  
the body of \_\_\_\_\_

By virtue of this my Order as Coroner for  
the County Borough of \_\_\_\_\_, in the County  
of \_\_\_\_\_, you are required to appear before  
me and the Jury at \_\_\_\_\_ in  
the said Borough, on \_\_\_\_\_ the \_\_\_\_\_ day  
of \_\_\_\_\_ at \_\_\_\_\_ o'clock in the \_\_\_\_\_ noon,  
to give evidence touching the cause of death of  
\_\_\_\_\_ and make a *post-mortem*

examination of the body with an analysis, and report thereon at the said Inquest.

Given under my hand this       day of  
1899.

To

*Coroner.*

In the interests of science and medico-legal medicine, it would be well if all medico-legal examinations, at least in cities with a medical school, could be conducted in some central institute, open to all duly qualified medical men and registered medical students.

Where *Cremation* is to be carried out, special certificates are to be filled up in addition to the customary one presented to the Registrar of Deaths. It is very desirable that all bodies about to be cremated should be submitted to a thorough scientific examination, and it would be well if a medical report were made compulsory.

## CHAPTER XI

### MISCELLANEOUS CONSIDERATIONS

IN conclusion, we may refer to some few remaining points of importance to the practical pathologist.

**Restitution of the Body.**—The æsthetics of an autopsy must on no account be lightly regarded. The body should be so left as to present no manifest evidences of the operation. No displacement or deformity must be visible. Cuts into conspicuous parts are to be avoided. The face is always to be maintained intact. Special care must be taken in the replacement and fixation of the skull cap. It is often well to wire the bones together, or to fix them by means of double-pointed or U-shaped nails. In many cases it is well to arrange that the median incision should not appear above the level of the shroud. Blood and all fluids must be completely removed from the cavities. A common scoop is useful for “bailing out.” The brain is frequently placed in the body cavity. Gamnett advises that the cranial cavity be filled with a sand-bag, easily made adaptable by spreading a

cotton cloth, eighteen inches square, heaping on it house sand, and then taking up the corners and tying with string.\* The foramen magnum and apertures for the large vessels may be plugged with cotton wool or tow if necessary.

Fine sawdust is exceedingly convenient in filling up the cranial and other cavities. It will be found that tow, when damp, can be readily moulded and packed so tightly as to make any part of firm consistency. Particular care must always be taken to prevent escape of blood or fluids from the mouth. When the pelvic organs have been removed plug the outlet with tow.

The "operculum" may often with advantage be fixed in position. A rod may be necessary to stiffen the spine if a portion of the vertebral column has been removed. Sometimes plaster of Paris is used to stiffen parts. Tow or cotton wool is occasionally placed directly beneath the long anterior incision to prevent oozing. In some cases a strip of plaster is applied over the incision.

The body is stitched up with stout thread introduced by means of a surgical needle (some prefer the curved form) from within outwards, starting at the pubes.

\* Gannett (W. W.), "Post-mortem Examinations," article in 'Reference Handbook of the Medical Sciences,' vol. v, 1889, pp. 783—791.

The cadaver must be left scrupulously clean, particular care being taken to wash the hair free from all blood. The clothes must be replaced, and the corpse and furniture left as it was arranged before the autopsy.

Occasionally a medical man is called upon to advise regarding the process of *embalming*.\*

**Records.**—A written report should be made on every case. This will vary somewhat in form and length, according as to whether the examination has been undertaken for medico-legal or purely scientific purposes. Generally it is well to have the notes taken down from dictation as the examination is proceeded with.

In medico-legal cases all medical men present at the inspection should sign the report, which, of course, should only record facts, and be innocent of any suggestion of opinions.

Many pathologists use special forms. Some recommended by asylum pathologists are rather too elaborate to be practicable for general cases.†

In medico-legal reports all superfluous matter must be excluded. The report must be concise, definite, simple in form, and unmistakable in language.

\* See special article. Read (Julian, A.) 'Reference Handbook of the Medical Sciences,' vol. ii, 1886, p. 666; also Thomas, A. R., 'A Practical Guide for making Post-mortem Examinations,' 1873, pp. 320—325.

† See 'Index Pathologique for the Registration of the Lesions recorded in Pathological Records or Case-books of Hospitals and Asylums,' by James C. Howden, M.D., 1894.

An interesting and suggestive, but now somewhat out-of-date, manual was published many years since under the authority of the London Medical Society of Observation, in which certain forms were advised.\*

After describing the abnormal parts, a note that "the remaining organs were healthy" will often save time and prevent confusion.

Virchow's 'Regulations for the Guidance of Medical Jurists in conducting Post-mortem examinations for Legal purposes,' and his examples of reports, may be studied with advantage.†

Ogston gives specimens of the various forms of medico-legal reports as required in Scotland.‡

Men about to practise in Scotland must make themselves acquainted with the details of their relationship to the Procurators-Fiscal.§

Frequently data respecting size and weight of different parts of the body in different sexes,

\* 'What to Observe at the Bedside and after Death in Medical Cases,' 1854.

† 'A Description and Explanation of the Methods of performing Post-mortem Examinations in the Dead-house of the Berlin Charité Hospital, with especial reference to Medico-legal Practice,' by Professor Rudolph Virchow. English translation, by Dr T. P. Smith, 1880.

‡ Ogston, 'Lectures on Medical Jurisprudence,' 1878.

§ See 'Regulations for Procurators-Fiscal in Criminal and other Investigations,' Crown Office, Edinburgh.

and at varying ages, are required, when reference may be made to Vierordt's well-known work.\*

Convenient charts engraved on slates have been designed for the marking in of lesions and life-size diagrams of the brain. These have been introduced so that accurate records of the size, shape, and extent of gross lesions can be readily prepared.†

It is wise to have a blackboard marked with the names and average weights of the different organs, and so arranged that the numbers ascertained in the case under examination may be entered up directly the organ is weighed on removal from the body.‡

As far as possible, all organs and important parts of the body should be weighed and measured. Every organ except the heart should be weighed before being cut. It is still customary to express the weight in ounces in this country. It is to be regretted that the decimal system is not more generally used. The weights

\* Vierordt, 'Anatomische, Physiologische, und Physikalische Daten und Tabellen zum Gebrauche für Mediciner,' 1893.

† Sold by John Bale, Sons, and Danielsson, 83—89, Great Titchfield Street, London, W.

‡ A mounted and varnished table, for use in the post-mortem room, is published by Messrs. J. and A. Chnrehill. 'Table of the Average Weights of the Human Body, and of several of the Internal Organs, at Eighteen Periods of Life in both Sexes,' by Robert Boyd, M.D., 1882.

and measurements vary considerably according to sex, age, and size of the individual. The following merely indicates the rough average weight of normal adult male organs :

Brain . . . . .	50 ounces.
Heart . . . . .	10 „
Lungs :	
(right) . . . . .	23 „
(left) . . . . .	20 „
Liver . . . . .	50 „
Spleen . . . . .	5 „
Kidney . . . . .	5 „

A useful table of the weights and measurements, taken from Nauwerck's 'Sectionstechnik,' is given by Mallory and Wright.\*

Data respecting the normal weight and dimensions of the heart are given in several readily accessible text-books.†

In hospitals the post-mortem reports are generally entered in suitable books or on special forms. These should be numbered and indexed, both as regards the name of the subject and the pathological conditions found. It is well to have the cases indicated by a progressive number,

\* Mallory and Wright, 'Pathological Technique,' 1898, p. 36.

† See Hamilton, 'Text-book of Pathology;' Jones, Sieveking, and Payne, 'Manual of Pathological Anatomy,' 1875, pp. 334—337.

which will be found very convenient and time-saving when specimens have to be reserved for museum purposes or for more detailed investigation, as the number can then be safely placed on the jars containing the preparation with the certainty that no confusion can subsequently arise in identifying the same. At the head of the report the complete pathological diagnosis should be entered. Then follow particulars as to name, age, occupation, residence, dates of admission, death, and autopsy, name of physician or surgeon, clinical diagnosis, operation, and outline of clinical history. After this comes the pathological report, which should be signed by the pathologist responsible for the conduct of the examination.

**Preparation of Museum Specimens.**—The duty of assisting in the progress of medical science makes it incumbent on all pathologists to adopt the best means for the preparation and preservation of specimens suitable for museum purposes. The introduction of formalin has done much to further such efforts. It is, however, impossible here to do more than refer the student to readily accessible sources where full details may be obtained.\*

\* Caird and Cathcart, 'A Surgical Handbook,' 8th edit., 1897, p. 293; Gibbes, 'Practical Pathology and Morbid Histology,' 1891; Hamilton, 'A Text-book of Pathology,' vol. i, 1889, p. 43; Rolleston and Kanthack, 'Manual of Practical

It is sometimes well to take casts of unusual displacements or exceptional deformities.\*

**Preservation of Specimens for Microscopical Examination.**—It is also part of the duty of anyone undertaking a post-mortem examination to select and suitably preserve tissues needing microscopic investigation. It does not come within the scope of these articles to enter on this large field, and indeed such is unnecessary, as full particulars are to be obtained in many readily accessible works.†

'Morbid Anatomy,' 1894, p. viii; Willett (E. W.), "Preservation of Specimens in Spirit," 'Lancet,' 1893, Nov. 25th, vol. ii, p. 1349; Wynter and Wethered, 'A Manual of Clinical and Practical Pathology,' 1890, p. 299.

\* For preparation of plaster and papier-maché casts, see Caird and Cathcard, 'A Surgical Handbook,' 1896, 7th edit., p. 237; for preparation of paraffin wax casts, see Peters, "A New and Original Method of making Casts," 'Brit. Med. Journ.,' 1898, vol. ii, p. 621.

† Works dealing with the selection, preservation, and preparation of morbid histological specimens:—

In several of the works already referred to in this manual particulars will be found regarding the investigation of morbid histological preparations. The following references will probably be found of special service:

DELAFIELD and PRUDDEN. A Handbook of Pathological Anatomy and Histology. 5th edit. 1897.

GIBBES. Practical Pathology and Morbid Histology. 1891.

GOODALL. The Microscopical Examination of the Human Brain. 1894.

FRIEDLÄNDER-EBERTH. Microscopische Technik. 1895.

Remember it is well in many diseases to retain samples of the blood in the form of films.\*

**Photography** now forms an almost essential adjunct to pathological investigation. Every post-mortem room should be equipped with apparatus suitably arranged for the photographing of the whole body or any of the organs.

---

HAMILTON. Text-book of Pathology. Vol. i, 1889.

VON KAHLDEN. Methods of Pathological Histology. English edition translated by Morley Fletcher. 1894.

LEE and HENNEGUY. *Traité des Méthodes techniques de l'Anatomie microscopique*. 1896.

LEE (A. BOLLES). The Microtometist's Vade Mecum. A Handbook of the Methods of Microscopic Anatomy 4th edit. 1896.

MALLORY and WRIGHT. Pathological Technique. 1898. Pp. 204—383.

POLLACK. Methods of Staining the Nervous System. English translation by W. R. Jack, 1899.

RIBBERT. *Lehrbuch der pathologischen Histologie*. 1896.

SQUIRE (P. W.). Methods and Formulæ used in the Preparation of Animal and Vegetable Tissues, including the Staining of Bacteria for Microscopical Examination.

WEICHSELBAUM. The Elements of Pathological Histology, with special reference to Practical Methods. English translation by W. R. Dawson, 1895.

WETHERED. Medical Microscopy. 1892.

\* For methods of collecting and preserving blood, see Cabot, 'The Clinical Examination of the Blood,' 1897; Coles (A. C.), 'The Blood: how to Examine and Diagnose its Diseases,' 1898. Both give references to modern literature.

Photo-micrography has of recent years proved of great service in permanently recording minute details.\*

**Preservation of Material for Bacteriological Investigation.**—It is extremely important that the student should fully realise the importance of suitably collecting and fitly preserving discharges, blood, and tissues which it may be necessary to submit to a bacteriological examination. The necessary steps are fully indicated in the many modern manuals now at his disposal.

\* See Pringle, 'Practical Photo-micrography,' 1893; and ordinary handbooks on photography.

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